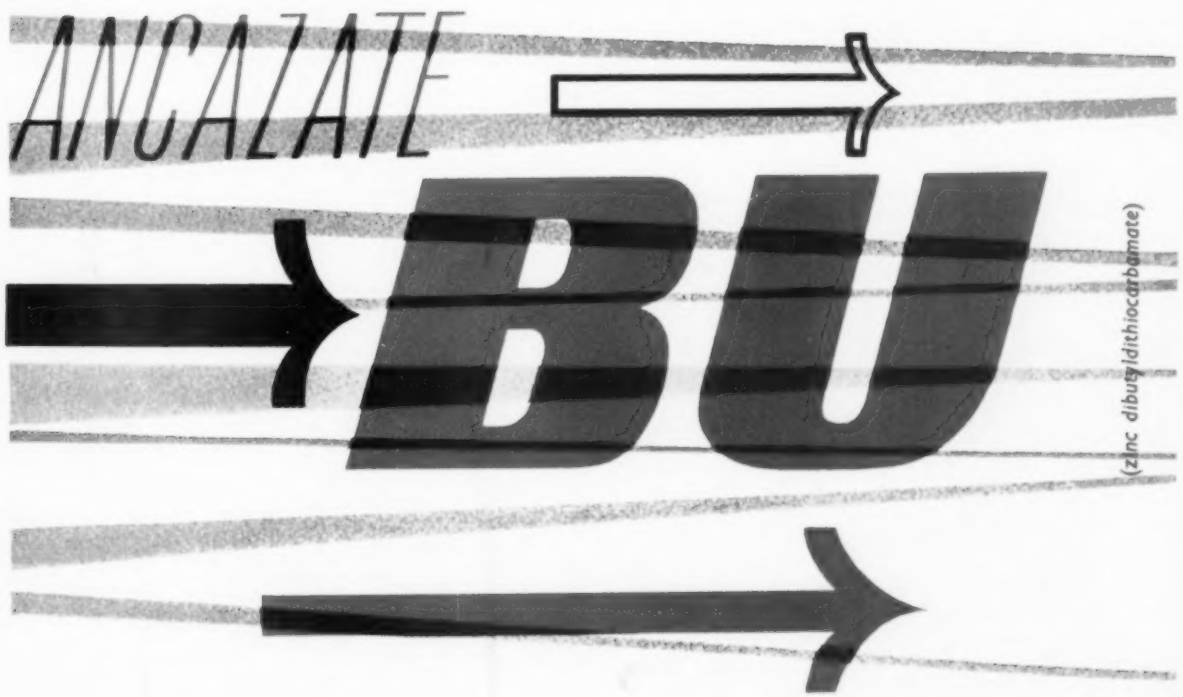
RUBBER and PLASTICS WEEKLY

VOLUME 140 NO. 9 MARCH 4 1961 ONE SHILLING



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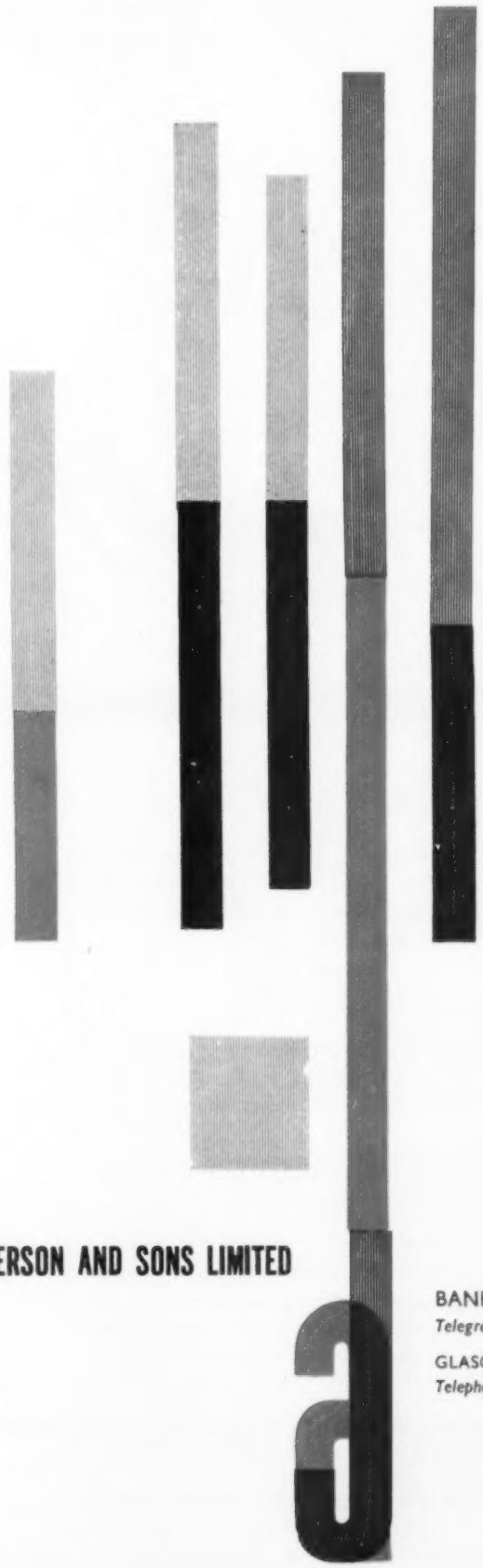

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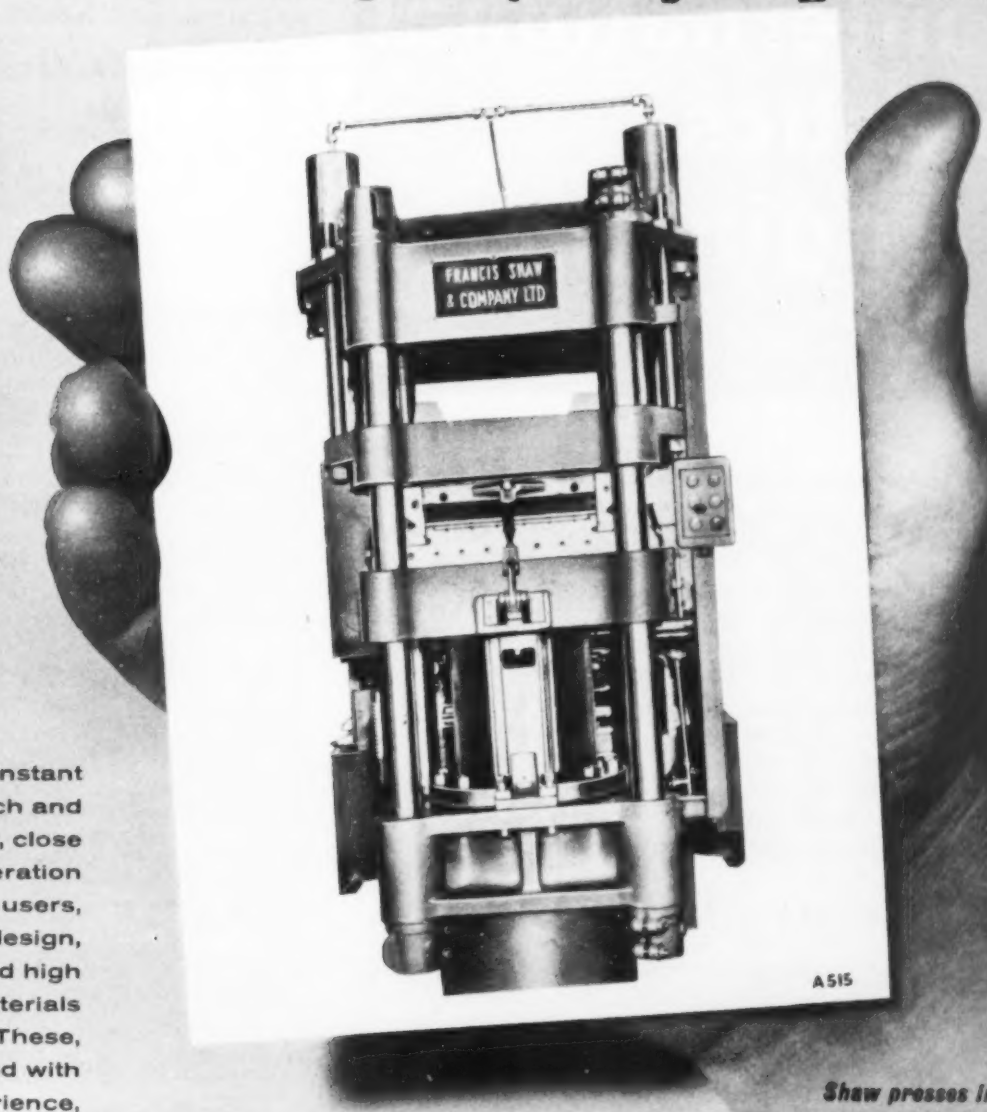

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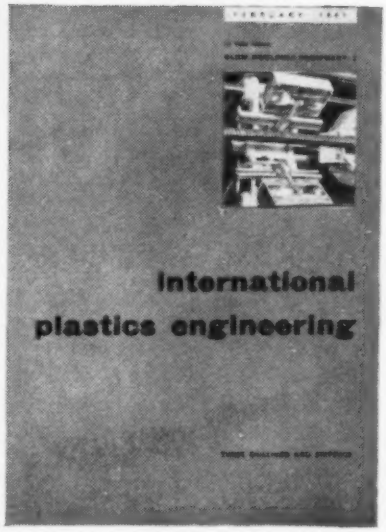

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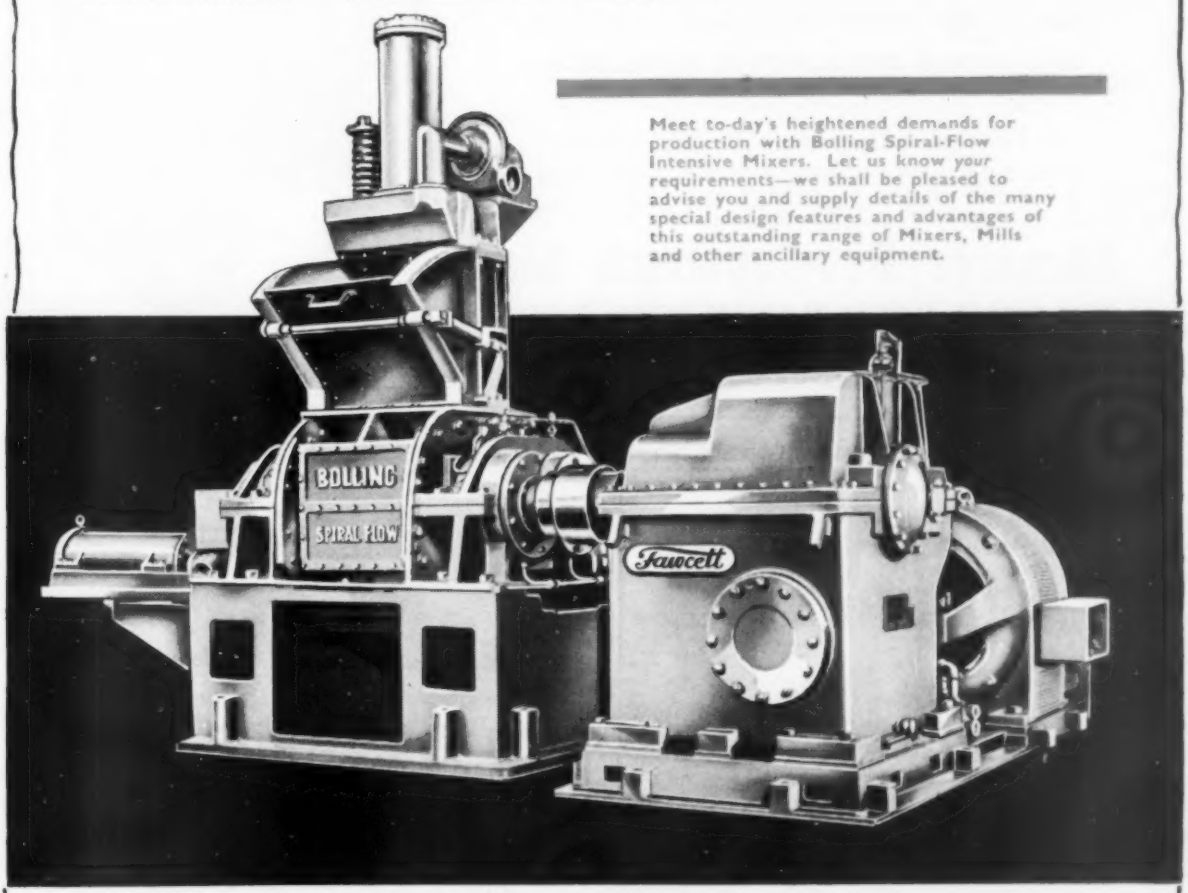

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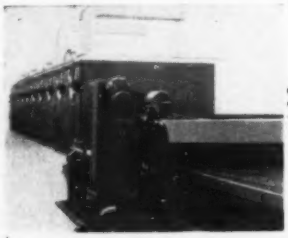

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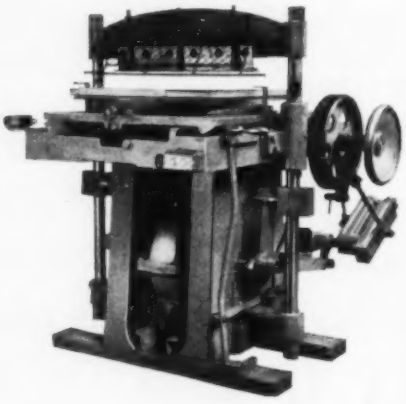

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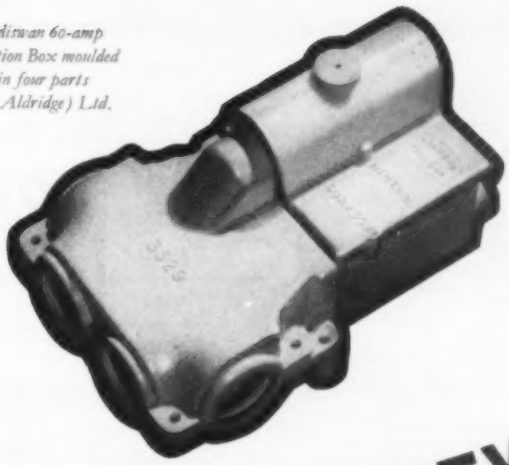

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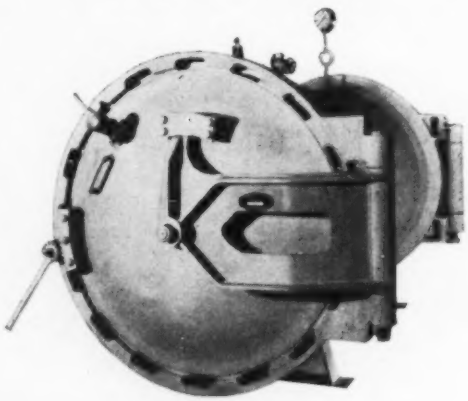

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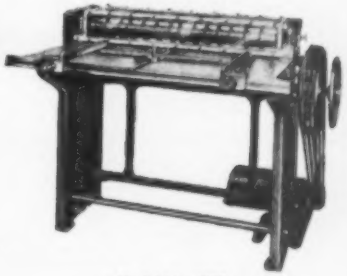

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 140 *IN ITS 77th YEAR* **No. 9**

March 4 1961

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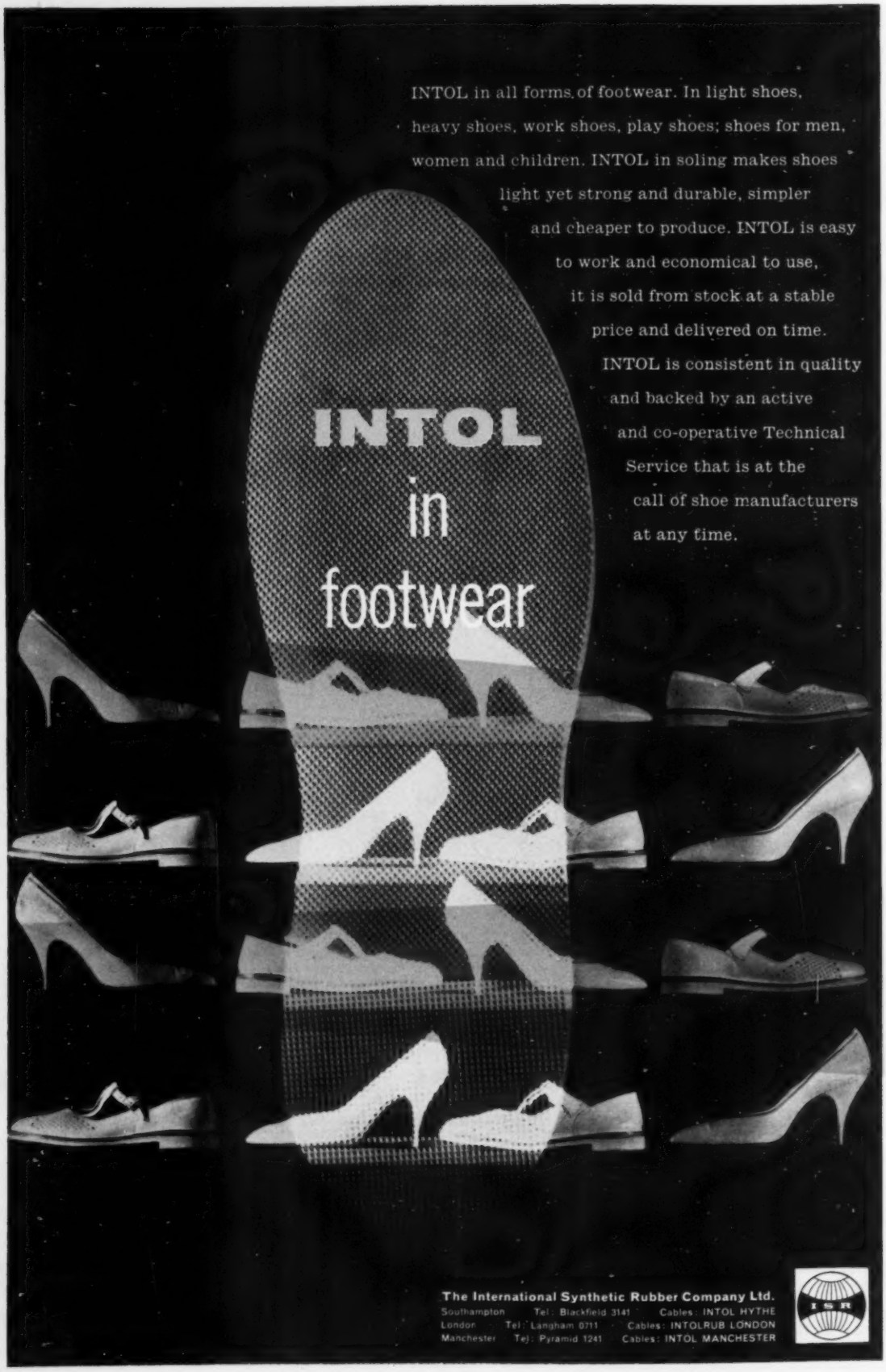
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NOTES of the WEEK

The New Name

WITH this issue this journal appears under the new name of RUBBER AND PLASTICS WEEKLY. We believe and hope it will mark the beginning of a new phase of growth and progress as the leading weekly publication on rubber and plastics, published regularly for 77 years. Apart from the name, and the need to adapt policy and outlook to new conditions, the journal will remain devoted to informing the industries on new plant, plant expansion, fresh appointments, technological advances, new grades of materials, and new machinery and product developments. We were proud of the old title, but we have decided to change it because we feel RUBBER AND PLASTICS WEEKLY more correctly describes the function of the journal, and our responsibilities to these industries.

Export Problems

THE constant cry 'we must export more' has become platitudinous without producing any results. A recent survey showed that 30% of the UK's exports of manufactured goods in 1958 came from only 40 firms. Since 1950 this country's share of the world's exports of manufactured goods has fallen from 25½% to 16½%. During the 1950s our comparable increase in exports was 21%, against 62% for USA, 98% for France, 305% for Japan and 511% for Germany. The increase of the remaining industrial countries' exports was 114%.

The thriving UK market of the 1950s seems to have lulled most businessmen into believing that 'there's no place like home.' Yet, apart from considerations of the country's economy as a whole, it is a disadvantage for a firm of any size to be tied to a single market. For example, the current recession in the UK car industry has naturally contracted the market for tyres. A firm like Dunlop, however, 70% of whose sales are in tyres, has remained comparatively unaffected—and one of the major reasons for this is the fact that the company has built up a considerable export business.

Most firms, of course, do not possess the resources of Dunlop, but, beyond a certain limit, this is not a question of size. Nor is it necessarily a question of negotiating economic barriers: last week the British trade mission from the recently created Export Council for Europe reported that the UK could increase exports of a wide range of goods to France, despite the tariff discrimination against British products resulting from the Common Market. One of the main problems to be overcome, the mission thought, was the general French ignorance of British products. More advertising and promotion of all kinds was required.

Practical Promotion

PROMOTION—or rather the lack of it—lies at the root of our export problem. A recent Board of Trade survey of UK plastics raw materials exports to New Zealand has emphasized this. In this market US manufacturers are said to be more 'pushing,' and to supply much more promotional and technical information. Recognition of this promotional problem is one thing, however; doing something about it quite another. A down-to-earth approach to the problem has been made by the Advertising Association in a booklet called 'A Practical Guide to the Promotion of Exports,' which has been reissued this week. This is a refreshing approach, without exhortation and without frills, and should prove valuable to every rubber and plastics manufacturer with an export potential. For example, one aspect dealt with is that of preparing coloured packs and display material. It is obvious that colour combinations with strong religious or political connotations can have a bad effect, but there may be many more subtle colour associations that have to be taken into account.

Surveys have shown that in Belgium and parts of Eastern France the 'blue for a boy and pink for a girl' convention is reversed. In Moslem Pakistan, yellow—the colour of the robes worn by Brahmin priests—is unpopular. Yellow in Venezuela has a definite medical significance because it is the colour adopted for all transport and public signs of the health authorities. In the Far East colour associations assume great significance—red, for instance, is always associated in China with good luck and happiness. Points like these may appear to be small ones, but the cumulative effect of ignoring them can mean the difference between gaining and losing an order.

Practical approaches of this kind have a good, solid punch compared with the theoretical sparring of much export literature. We hope that the Federation of British Rubber and Allied Manufacturers' EFTA booklet, when it appears, will be a production of this kind of realistic export thinking.

NEWS *Briefs*

MORE DOW POLYOLEFINS — DURAPIPE IN SOUTH AFRICA — BAYER LONDON QUOTE — JAPAN'S PVC OUTPUT — ITALIAN RUBBER FOR RUSSIAN OIL

●**Czechoslovakia** — Czechoslovakia and Burma have signed a trade agreement in Rangoon, according to Ceteka, the Czechoslovak news agency. Under the agreement, Czechoslovakia will receive from Burma products including rubber against deliveries of engineering goods.

●**Russia** — Italy and the Soviet Union have agreed on a considerable increase in trade between the two countries during the next five years, according to the Soviet News Agency Tass. Trade between the two countries will increase by about 25% this year compared with 1960. Russia will export oil and other goods, in exchange for products including synthetic rubber.

●**Australia** — Lightnin Mixers Ltd. of Poynton, Cheshire, has despatched to Australia what it claims is one of the largest consignments of fluid mixers ever to be exported from the UK. The order comprised 47 units from the company's standard range; the mixers will be used in a new synthetic rubber plant being built by the Australian Synthetic Rubber Co. Ltd.

●**United States** — The US Rubber Co. will close its Chicopee tyre plant for one week, beginning March 27, because of 'excessive tyre inventories and falling car production'. This will be the second one-week shutdown of the plant this year. The Chicopee plant has been producing about 28,000 tyres daily.

●**South Africa** — Arrangements have been completed for the production in South Africa of Durapipe thermoplastic pipes and fittings, which, up to the present, have been produced only by Durapipe and Fittings Ltd. in the UK. The piping, for which it is said there has been a growing demand in South African industry, will be manufactured by Pretoria Industrial Plastics Ltd., a subsidiary of the Anglo-Transvaal Mining group. Sole selling agency will be H. Incledon (SA) Ltd.

●**Czechoslovakia** — The UK Board of Trade has announced that agreement has now been reached with the Czechoslovak Ministry of Foreign Trade about quotas for Anglo-Czechoslovak trade in 1961. The quota lists make provision for Czechoslovakian purchases of about £5.6m. of UK goods including rubber products, latex, tyres and tubes (quota: £75,000) and plastics (quota: £450,000). The quota lists also provide for the issue of UK import licences for Czechoslovak goods up to a total of about £8m.

●**Venezuela** — The Venezuelan Minister of Agriculture has stated that modified requirements have been introduced for rubber production in the Territory of Amazonas, but that production still remains under the Ministry's control. The Minister said that, in future, rubber should be marketed in sheets instead of in balls.

●**United States** — Dow Chemical has announced plans to build a polyolefin plant at its Plaquemine, Louisiana, site. It will produce high and medium density polythene, polypropylene and ethylene copolymers, and is expected to go on stream by the end of next year.

●**South Africa** — Carrol James, managing director of the Goodyear Tyre and Rubber Co. (SA) has said that the Rhodesian Federation's increased import duties on car and truck tyres and tubes will be a blow to the whole South African industry. Mr James said that the duty of 40 cents per lb. will increase the cost to the Rhodesian customer by R10 (£5) for South African tyres. 'We will fight it. We are going to retain the Rhodesian market at any cost to us,' he added. T. K. Miller, managing director of Firestone (SA), has said the new duty will make the export of tyres to the Federation 'almost prohibitive.'

●**Western Germany** — It is reported that Farbenfabriken Bayer AG has made an application to the London Stock Exchange for a quotation for its DM735m. (£63m.) issued share capital. Dealings are expected to begin shortly.

●**Japan** — Recently published figures show that PVC production in Japan in 1960 topped 250,000 tons. This was an increase of 43% on the 1959 figure. The greatest increase was shown by rigid PVC.

●**Russia** — Consignments of machinery and plant to the value of £750,000 are being shipped to the USSR by Sterling Moulding Materials of Stalybridge, Cheshire. The equipment will be installed in Russia's first factory for the production of polystyrene moulding powders. The factory has been designed to have a capacity of 10,000 tons a year and to produce several grades of high impact polystyrene.

'— and for the life of me, I can only think of a hundred!'— 526

Expansion Week at I.C.I.

£100m. PETROCHEMICAL PROJECT WITHIN THE COMMON MARKET

Hillhouse PVC capacity to be lifted to 115,000 tons

IMPERIAL Chemical Industries is to set up a £100m. petrochemical complex within the European Common Market. This is the most important of three expansion announcements which the company has made this week. The other projects involve raising the PVC capacity of its Hillhouse plant to 115,000 tons, and constructing a general-purpose pilot plant at Billingham.

For its Common Market project, the company is negotiating for a 300-acre site near Rotterdam. Construction is expected to begin early next year, and I.C.I. envisages that £100m. will be spent on the complex in the next ten years. The complex will probably be comparable in scope and size to I.C.I.'s £120m. Wilton plant, which produces both polythene and polypropylene. The first unit is likely to go on stream in 1964.

Divisions which will be concerned with the Rotterdam project include Plastics, Dyestuffs, General Chemicals and Heavy Organic Chemicals. In addition to this project, a number of smaller plants will be built elsewhere in the EEC.

I.C.I. says that detailed plans for the starting of large-scale manufacture within the Common Market have been in preparation since July 1960, when the company set up a European Council to review the whole position and make recommendations.

This body has now been established as an operating board, with D. M. Bell as chairman, and has been given the responsibility of supervising I.C.I.'s interests in Western Europe as a whole, including both EEC and EFTA. It will report to Dr A. Caress, one of I.C.I.'s overseas directors.

The company adds: 'The decision to establish a major chemical works in Rotterdam as well as units elsewhere in the EEC reflects the company's intention to pursue a vigorous drive for chemical business in Western Europe. This area has always been an important market for I.C.I. products. The establishment of manufacturing units on the continent will not mean any relaxation of I.C.I.'s efforts to increase exports from the UK.'

With this step, I.C.I. will have a foothold in the fastest chemical growth area in the world. The consumption rate of chemicals in the EEC is twice that in the UK. This is partly due to heavy US investment in the area — more than 500 US chemical companies are estimated to have set up subsidiaries in the Six since the war.

New Plant at Hillhouse to Cope with Vinyl Demand

In another announcement, I.C.I. proposes to erect a new polyvinyl chloride plant at its Hillhouse works near Blackpool. This will raise its manufacturing capacity of PVC from the present figure of 70-80,000 tons a year to 115,000 tons a year by the beginning of 1963.

During the past ten years demand in the UK for vinyl materials has expanded nearly ten times to its present level of 110,000 tons a year. I.C.I. says that it is to keep ahead of this rapid development that it is now erecting a new plant which is 'capable of extension to meet the most optimistic market requirements of the future.'

The company adds that in continuing research and development I.C.I. has made important contributions to the advancement of polyvinyl chloride as a major plastics material, and these contributions have made possible the lowering of prices and the widening of the range of materials available.

The general pattern of large tonnage applications for PVC has remained unaltered in the last few years. Unsupported calendered sheet and cable still account for the largest tonnage. This is followed by supported sheet (leathercloth) and the general extrusions, including piping for water mains and effluent disposal and also rain water goods.

General-Purpose Pilot Plant at Billingham for Tonnage Batches

I.C.I. has also announced this week that its Heavy Organic Chemicals Division is to build a general-purpose pilot plant at Billingham, Co. Durham. This, it is said, will provide better facilities for the rapid manufacture of tonnage batches of development products. The plant is due for completion in late 1962.

The company says that, although it will still be necessary to build special pilot plants occasionally, the new plant, together with existing special pilot plants, will be capable of manufacturing the majority of chemicals which are planned for development in the next few years.

Equipment will be provided for carrying out such reactions as alkylation, amination and condensation.

I.C.I.'s Rotterdam project is expected to be comparable in size and scope to the company's Wilton plant. This view of the No. 3 olefin unit at Wilton shows a pair of oil heaters and steam heaters, soaker lines and primary fractionation equipment

Durapipe Cuts Prices

THERMOPLASTIC PIPES REDUCED BY UP TO 32%

REDUCTIONS of up to 32% have been made in the prices of many of the thermoplastic pipes and fittings manufactured by Durapipe and Fittings Ltd., of West Drayton, Middlesex, a member of the Incledon and Lamberts Group.

The price cuts were the result of a rapid increase in demand for the firm's products and improved production techniques, said R. L. H. Damerham, executive director of the firm. Last year, Durapipe's UK sales rose by over 40% and several new injection moulding presses are about to be installed to meet growing demand for the fittings.

New Structure

Under the new price structure, cuts of between 4 and 32% are made on certain sizes of all three types of Durapipe piping and many of the firm's 450 fittings are reduced by up to 20%.

Only three of the larger bores of high impact PVC piping have been increased in price — by an average of about 11%. A number of the fittings are now available in additional sizes and materials.

Mr Damerham left this week for a three-week study tour of plastics manufacturing plants in USA, where he will investigate the material and technological developments.

Before leaving he said: 'We are a comparatively small company among the plastics giants, but because we enjoy certain advantages in technical knowledge — particularly in the use of ABS materials — we have managed to keep several years ahead of the rest of the industry here and in Europe generally.'

ISO Delegate

Mr Damerham, who is chairman of the plastics fittings sub-committee of the British Plastics Federation and UK delegate to the International Standards Organization, will be having talks with his opposite numbers in the American Fittings Manufacturers' Association, Society of the Plastics Industry and American Society for Testing Materials.

He will also take the opportunity of meeting distributors to discuss arrangements for strengthening Durapipe's sales in North America.

Burtonwood Deny Rumours

A denial that Burtonwood Engineering Co. of Warrington, a subsidiary of US Industries (GB), is to be acquired by another company, was issued recently by the Burtonwood Board.

John Boardman, chairman, said: 'There is no question of our being taken over by any company.'

Polyisoprene in the UK

Shell Chemical Co. has announced that development quantities of Cariflex isoprene rubber are now available for evaluation in the UK, as reported last week.

Shell was the first to produce this stereospecific polymer on a commercial scale in USA; its plant at Torrance, California, which has a capacity of 18,000 tons a year came on stream in October 1960. A second plant of double this capacity is to be built in the Mid-West.

In Europe an isoprene plant is currently under construction at Pernis, near Rotterdam. This is part of Shell's plans for the production of polydiene rubbers in the UK and Holland.

Viscotex Tissues

A type of cleansing tissue for use in geriatric hospital wards has been developed by Robinson and Sons Ltd., Chesterfield. The tissue is based on Viscotex bonded fabric.

Commercial Production of Polyvinyl Chloride

B. F. Goodrich Chemical Co. has announced plans to begin commercial production of polyvinyl dichloride in USA by May 1.

Facilities for the production of this material — which will be marketed as 'Hi-temp Geon' — are currently being installed at the firm's Louisville, Kentucky, plant. Hi-temp Geon is now being produced in pilot-plant quantities at Goodrich's Avon Lake (Ohio) Development Centre.

Described by the company president, Harry B. Warner as 'the first significant breakthrough in the vinyl industry since the development of the first rigid vinyl 13 years ago, the new material withstands the effects of boiling water so that it can be made into household hot-water plumbing and even industrial hot acid piping.'

Piping made from the new material is one-sixth the weight of copper, making possible prefabricated plumbing walls which can be easily transported to job sites and swung into position with light cranes.

Applications envisaged by the company for polyvinyl dichloride include pipe and fittings, tanks, duct work and missile and rocket parts. The material can be worked on existing processing equipment.

Goodrich does not give details of the manufacturing process. Polyvinyl dichloride could be made either by chlorinating polythene or by polymerizing ethylene dichloride. A third process — chlorination of polyvinyl chloride — has been revealed in an Australian Patent application.

Dunlop Workers End Strike

THERE was a full resumption of work this week at the Dunlop Rubber Co.'s factory at Speke, where 3,500 workers had been on strike for more than a fortnight over a compensation pay claim.

Following a mass meeting in Liverpool, the workers agreed to return on the basis that there should be informal talks between the strike leaders, the management and officials of the Transport and General Workers Union. In addition there is to be a full inquiry into the causes of the strike and negotiating procedure.

At another of the company's factories at Walton, Liverpool, there was a complete resumption in the footwear section where 500 workers were laid off last week, and a further 750 put on a four-day week because of a shortage of materials processed at the Speke factory.

Arrangements have been made between the management and the National Union of General and Municipal Workers to permit Dunlop to bring in supplies from outside sources.

The 1,100 rubber workers who have been on strike at the factory of the India Tyre and Rubber Co. Ltd., at Inchinnan, Renfrewshire, have also returned to work.

Goodyear Workers Back

Workers at the Glasgow factory of Goodyear Tyre and Rubber (GB), who have been on strike over a dispute concerning payments for off-standard work, returned to work this week.

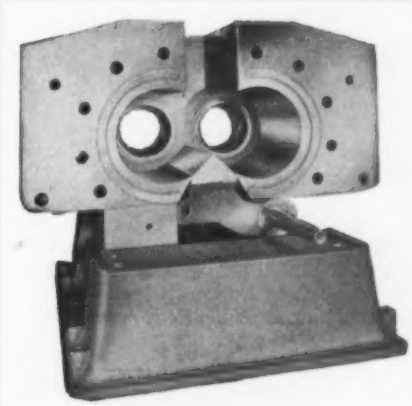
NEW BANBURY* DROP DOOR DELIVERS 3 BIG BENEFITS

- **leakage prevention**
- **shorter cycles**
- **almost instantaneous discharge**

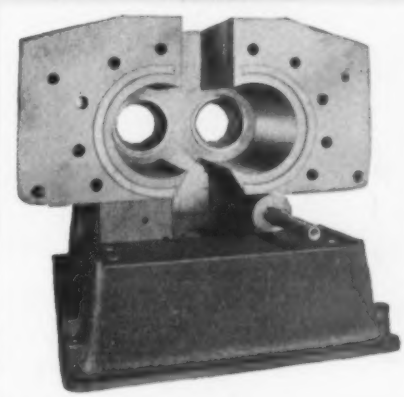
Here's a new development in Banbury mixer design: the hydraulically-operated drop-door . . . now available as an optional feature on all new production-size machines. The drop-door design does away with a source of leakage and contamination which cannot be avoided in sliding-door design. Clearances which permit some leakage are required for sliding action which is not the case with the drop-door. The new door is hinged, and the surfaces of the door edge and the bottom of the mixing chamber are tapered so that a good line of contact is obtained. The door is leakproof throughout a full period of normal wear and there are no tailings left to contaminate a succeeding batch. The new door has been clocked as low as eight seconds for opening, discharge and closing—more than twice as fast as a sliding door. As a result, the overall mixing cycle is reduced. And, in short-cycle operation, discharge time is in better balance with actual mixing time.

Faster discharge, besides cutting cycle time, is particularly advantageous when formulas require almost instantaneous discharge after pre-determined temperature is reached. With some, a few seconds lag will permit the stock to set up in the mixing chamber.

* *Banbury is a registered trade mark in many countries throughout the world*



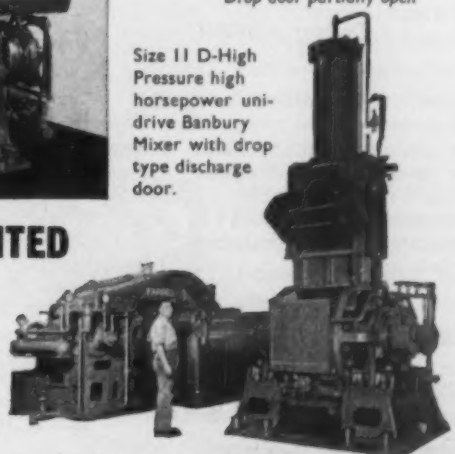
Chamber of Banbury with drop door in closed position



Drop door partially open

Angular view of drop door in open position

Size 11 D-High Pressure high horsepower uni-drive Banbury Mixer with drop type discharge door.



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Accelerators and Antioxidants for Rubber

PART I: GATHERING THE RAW MATERIALS

By L. M. DADSON, M.A., I.C.I. Dyestuffs Division *

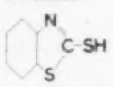
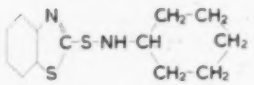
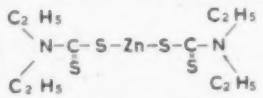
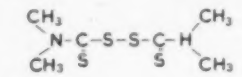
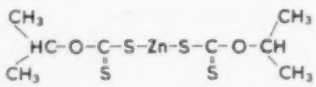
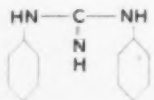
THE supply of chemicals to the rubber industry can be considered in three stages:

1. Gathering of raw materials.
2. Manufacture.
3. Distribution.

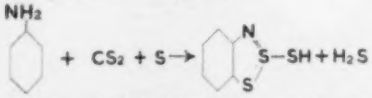
Accelerators and antioxidants — perhaps the two major classes of rubber chemicals — will be considered here. First they will be traced back through their intermediate stages to their ultimate raw materials.

It is possible to classify accelerators into seven common chemical categories which, alone or blended, cover most of the available products. Table 1 lists those categories, and illustrates each one with a typical example.

TABLE 1
RUBBER ACCELERATORS

Class	Example	Formula
Thiazole	Mercaptobenzthiazole (MBT)	
Sulphenamide	Cyclohexyl benzthiazole sulphenamide (CBS or HBS)	
Dithiocarbamate	Zinc diethyl dithiocarbamate (ZDC)	
Thiuram	Tetramethyl thiuram disulphide (TMT)	
Xanthate	Zinc isopropyl xanthate (ZIX)	
Guanidine	Diphenyl guanidine (DPG)	
Aldehyde/amine	Butyraldehyde/aniline (BA)	Condensation product

1. Mercaptobenzthiazole (MBT) is made by reacting aniline with carbon disulphide and sulphur:



Once MBT has been made, the other common thiazoles and the sulphenamides are within grasp, from MBT liquor, the sodium salt of MBT, which is a most useful intermediate. From MBT comes dibenzthiazyl disulphide (MBTS) and the zinc salt of mercaptobenzthiazole (ZnMBT). From MBT also lead to the sulphenamides.

2. The sulphenamides are obtained from MBT by reaction with the appropriate amine. In the case of HBS, the amine, of course, is cyclohexylamine, which ties into rubber chemical manufacture particularly neatly because it is a derivative of aniline. Other amines of technical interest include tert.-octylamine and morpholine.

3. Carbon disulphide and amines feature too in the dithiocarbamates, ZDC, for instance, is made from CS_2, diethylamine and a suitable zinc salt:

$$2(C_2H_5)NH + 2CS_2 + Zn \longrightarrow (C_2H_5.N.CS.S.)_2Zn$$

Other dithiocarbamates are prepared by variation in the amine (ethylaniline gives ZEP), by variation in the metal (sodium gives SDC) or by using an ammonium derivative, for instance, instead of a metal, as in diethylammonium diethyldithiocarbamate.

4. Thiurams use almost precisely the same starting points as dithiocarbamates, but no metal is involved in the final product. TET, for instance, is based on carbon disulphide and diethylamine, and in fact passes through a dithiocarbamate stage, the thiuram being obtained by oxidation. Using dimethylamine instead of diethylamine results in TMT.

5. Invariably, so far, CS_2 has appeared in these accelerator requirements, and the xanthates are no exception. ZIX, for instance, involves isopropanol, a source of zinc, and carbon disulphide. Sodium instead of zinc produces SPX.

6. The guanidines, however, can be different. No sulphur appears in the molecule, and while DPG, the most common, is based, like MBT, on aniline, the reaction involved can be with cyanogen chloride. DOTG, the other common guanidine, can be based on o-toluidine reacted with cyanogen chloride. Alternatively, carbon disulphide can be used in the manufacture of DPG, as when ammonia is reacted with thiocarbanilide. The latter is prepared from aniline and CS_2.

7. Aldehyde/amines are self-explanatory. Typical condensates, for instance, are of aniline and butyraldehyde or of p-toluidine and formaldehyde.

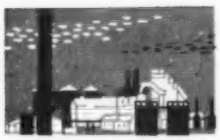
Putting all these points together, the major chemical requirements for a reasonable range of rubber accelerators can be arrived at, and are shown in Table 2.

Obviously these are not the ultimate raw materials, but before taking the next step back along the route, it is convenient to switch to antioxidants and to attempt for them the same sort of classification. Classification is much more difficult in this case because, on the whole, antioxidants tend to be less precise in structure, but the field can be divided broadly into two categories, amines and phenols. This corresponds to a technological division between stain-

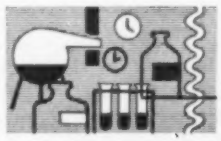
A paper delivered by Mr Dadson before the Southern Section of the Institution of the Rubber Industry.

CONTINEX

HAF and **ISAF**



Our new Dutch plant is an exact replica of the many carbon black plants our group own in America, ensuring absolutely an equivalent material to the American grades of **Continex HAF** and **Continex ISAF**



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ing and non-staining products. Each category can be sub-divided and a scheme which covers many of the important antioxidants is shown in Table 3.

1. Ketone/amine antioxidants are usually based on acetone, as the ketone, while the amine may be aniline, or a substituted aniline, or diphenylamine, which itself is a derivative of aniline.

2. Commercially, the most important aldehyde/amines are those in which aldol, which is 2-hydroxybutyraldehyde and is derived from acetaldehyde, is condensed with a naphthylamine.

3. Phenyl naphthylamines are either α- or β-naphthylamines. Phenyl-β-naphthylamine (PBN) is probably one of the world's best known antioxidants, and, once again, the starting point can be aniline, in conjunction this time with β-naphthol.

4. The substituted diphenylamines speak for themselves. They are based on diphenylamine, which is, as previously noted, a derivative of aniline.

5. An example of the p-phenylene diamines is symmetrical di-β-naphthyl-p-phenylene diamine, which can be made from p-naphthol and p-phenylene diamine, the latter being a derivative of nitroaniline.

6. A very common substituted phenol is styrenated phenol, which is made from styrene and phenol. Xylenols can be useful starting points too, these being readily available as commercial coal tar fractions.

7. Phenolic sulphides are less common than either substituted phenols or phenyl alkanes, but a typical one might be made from sulphur dichloride and a cresol.

8. The most powerful non-staining antioxidants are the phenyl alkanes, and these are normally based on the condensation of an alkylated phenol with an aldehyde. Formaldehyde is often one component, while a suitable phenol, which could also feature in class 4 — the substituted phenols — might come from reacting p-cresol with an aliphatic alcohol or an olefine.

These various requirements can now be gathered together into Table 4, which shows what is needed to produce a reasonably wide range of antioxidants, and which matches the table produced for the accelerators.

With three exceptions, the building bricks both for the accelerators and for the antioxidants are organic chemicals. Of the three inorganic chemicals there are two chlorides, cyanogen chloride and sulphur dichloride, and these, of course, depend on chlorine which is extracted from salt. The third, which is possibly the most important accelerator raw material is carbon disulphide. This is made by reacting charcoal, mostly from Sweden, with sulphur vapour. The sulphur has been obtained principally from the USA until recently, but now it can come for instance, from the newly worked French natural gas deposits to make CS_2 partly a 'petrochemical.' There is a route in which the carbon too comes from natural gas, from methane[1], but this is not operated in the UK.

The rest of the required chemicals are organic. Aldol and butyraldehyde are derived from acetaldehyde: cyclohexylamine and diphenylamine are derived from aniline. This shortens the essential organic shopping list, which after splitting into aliphatic and aromatic groups, appears in Table 5.

Table 2
Common Intermediates for Accelerators

	Thiazoles	Sulphenamides	Dithiocarbamates	Thiurams	Xanthates	Guanidines	Aldehydes-amines
Carbon disulphide ..	X	X	X	X	X	—	—
Aniline	X	X	—	—	—	X	X
Amines:							
cyclohexyl	—	X	—	—	—	—	—
dimethyl	—	—	X	X	—	—	—
diethyl	—	—	X	X	—	—	—
Formaldehyde	—	—	—	—	—	—	X
Butyraldehyde ..	—	—	—	—	—	—	X
Isopropanol	—	—	—	—	X	—	—

Table 3
Rubber Antioxidants

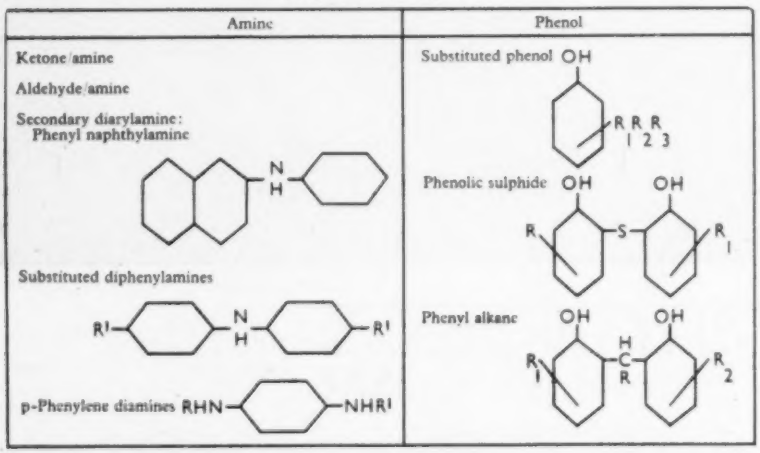


Table 5
Organic Intermediates for Accelerators and Antioxidants

Aliphatic	*Aromatic*
Dimethylamine	Aniline
Diethylamine	β-Naphthol
Formaldehyde	Phenols
Acetaldehyde	Cresols
Acetone	Xylenols
Isopropanol	Styrene

It is a good working generalization to say that in the UK organic chemicals industry, at present, the aliphatics are derived from petroleum, while the aromatics are derived from coal. If bituminous coal is heated,

Table 4
Common Intermediates for Antioxidants

	Ketone/amine	Aldehyde/amine	Secondary diarylamine	Substituted phenol	Phenolic sulphide	Phenyl alkane
Aniline	X	—	X	—	—	—
Diphenylamine ..	X	—	X	—	—	—
Acetone	X	—	—	—	—	—
β-Naphthol ..	—	—	X	—	—	—
Acetaldehyde ..	—	X	—	—	—	—
Formaldehyde ..	—	—	—	—	—	X
Phenols	—	—	—	X	—	—
Cresols	—	—	—	—	X	X
Xylenols	—	—	—	X	—	X
Styrene	—	—	—	X	—	—
Sulphur dichloride	—	—	—	—	X	—

at temperatures of 1,000°C. or more, in retorts without access of air, the bulk of the material is converted to coke, and coal gas, coal tar and a water layer containing ammonia are produced. This heating process is called carbonization.

From a rubber industry viewpoint, the importance of coke lies in its treatment with steam to form 'synthesis gas,' a mixture of carbon monoxide and hydrogen, which is used to make ammonia and methanol, and an alternative source of which is olefine 'tail gas.' This, of course, is a source of aliphatic chemicals but coal gas, with a minor contribution from coal tar, yields benzole and toluole, the sources of the great bulk of Britain's benzene and toluene.

Finally, the distillation of coal-tar into suitable fractions is a very important process in the British chemical industry, giving rise to a host of aromatic or heterocyclic compounds. The products of immediate interest for rubber chemicals are phenol, cresols, xylenols and napthalene. Schematically, the rubber chemical manufacturer's interest in coal is shown in Fig. 1.

Phenol appears in Figure 1 twice. Its production from coal tar distillation is of diminishing importance, a much more customary route being from benzene, either via benzene sulphonic acid or via monochlorbenzene. More recently phenol has been made from cumene (isopropyl benzene) which makes it a hybrid petroleum/coal chemical, depending on propylene from petroleum and benzene from coal. Styrene is also a hybrid. It is often regarded as a petrochemical, because it is made by firms who are part of the petroleum industry, but in reaching the ethylbenzene stage, benzene from coal is used in conjunction with ethylene from petroleum. Thus all the aromatics used in making rubber chemicals in Britain can be based, at least partly, on coal.

Petroleum can yield aromatic chemicals, and does so on a big scale in the USA. The prinicipal aim of the petroleum chemicals industry in this country, however, is to produce ethylene, for polythene, ethanol, for a host of purposes. The industry, essentially, is based on the cracking of imported naphtha, oriented towards this aim. At I.C.I.'s Wilton Works, for instance, the feedstock undergoes pyrolysis by the Kellogg method[2]. In this, hot hydrocarbon vapour is mixed with steam at a still higher temperature and, after a very brief contact time (about one second), the reaction is frozen. Compressed gas and petrol are passed through a warm fractionation unit which separates out the C_4 stream. Separation of methane, ethylene, propylene and ethane is the most difficult step in the whole plant process, and is achieved by low temperature refrigeration and fractional distillation under medium pressures.

The three products of interest to the rubber chemicals manufacturer are propylene, ethylene, and 'tail gas,' a methane/hydrogen mixture. Propylene yields isopropanol, either by reaction with steam or by reaction with sulphuric acid to form isopropyl hydrogen sulphate which is then hydrolized. Isopropanol is dehydrogenated to give acetone, a former source of which was by the fermentation of molasses, also the traditional route to ethanol. In this case too, tradition has yielded, and ethanol in Britain is now mainly produced by the hydration of ethylene. The catalytic oxidation of ethanol yields acetaldehyde, from which aldol and butyraldehyde are made. One other reaction of ethylene has already been mentioned: with benzene it gives ethylbenzene which in turn yields styrene.

Finally there is 'tail gas.' This is reacted with steam to give synthesis gas, similar to that obtained from coke. At I.C.I.'s Billingham Works, 'tail gas' is converted into ammonia and methanol, which are then used to make formaldehyde and dimethylamine, while ammonia is reacted with ethanol to give diethylamine. Schematically, the rubber chemical manufacturer's interest in petroleum is shown in Figure 2.

There is a balance, then, between the petroleum chemical industry and coal chemical industry as suppliers of raw materials to the rubber chemical manufacturer. How far that balance will be maintained in the future depends largely on economics. Coal is meeting the present demands made on it, and in some directions demand is not reaching the potential supply level. It has been calculated, for instance[3], that 100,000 tons of

Fig. 1

RUBBER CHEMICAL INTERMEDIATES FROM COAL

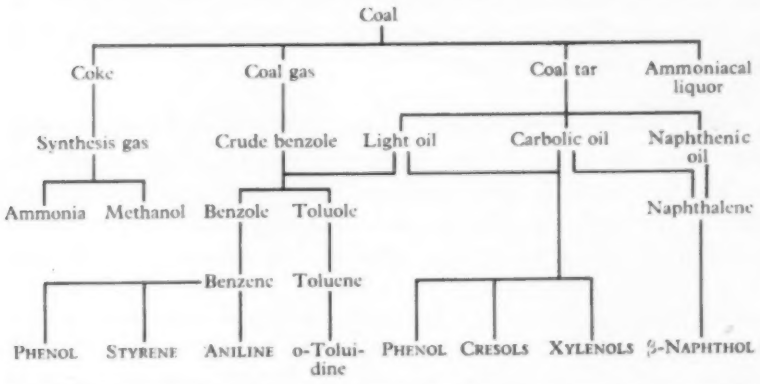
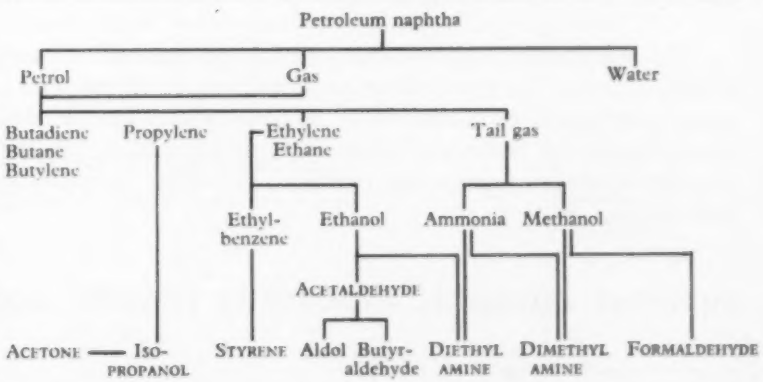


Fig. 2

RUBBER CHEMICAL INTERMEDIATES FROM PETROLEUM



WHAT TO STOCK AND WHAT NOT

Given a wide range of essential raw materials, each designed for the same job but varying in efficiency and specific application, the manufacturer who makes use of these materials must at some stage decide how many of the range to keep in stock.

This is one of the problems which confront the rubber compounder. With a considerable range of non-staining antioxidants from which to choose, he has to decide which to use for particular applications and, hence, which to stock. In some instances there are special requirements that dictate the type of antioxidant to be used, e.g. relative toxic hazard, ease of dispersion in latex compounds, etc. In the general case it has to be decided what level of efficiency is required.

There are two approaches to the problem. In the first instance, where the manufacture of a number of different types of article is all on a reasonable scale, there are many reasons in favour of maintaining a stock of several antioxidants. The rubber articles can be classified according to the efficiency of antioxidant required, as follows:—

Class A: for rubber articles that are relatively cheap and/or have only a short expectancy of service life—an antioxidant such as Nonox SP.

Class B: for rubber articles of medium quality and/or with expectancy of life of several years (e.g. more than three years)—a more efficient antioxidant, e.g. Nonox EX.

Class C: for rubber articles of high quality and/or with a long expectancy of service life—a highly efficient antioxidant e.g. Nonox WSP.

The actual choice of antioxidant within a group must be made on secondary considerations, e.g. the physical form of antioxidant most suited to the particular manufacturing process.

Alternatively, it may be more convenient for only one antioxidant to be held in stock. The question then is, which one? To decide this it is necessary to study the effect of antioxidant dosage on technical efficiency. Conventional ageing tests on rubber indicate that the protective effect is not proportional to the antioxidant dosage. Increasing increments of dosage have progressively smaller effects until a dosage is reached beyond which there is very little additional benefit. This can be called the 'optimum dosage'. Generally speaking, the more powerful the antioxidant, the lower is the 'optimum dosage'. Further, it can be demonstrated that the maximum effect (i.e. protective effect) depends on the antioxidant efficiency.

The two factors, high efficiency at low dosage and the technical effect at 'optimum dosage' or higher, favour the more efficient antioxidants. In circumstances such as these, the recommended antioxidant would be Nonox WSP or CNS, which can be used at 'optimum dosage' (ca. 1.0%) where maximum protective effect is required, and at selected lower dosages where economy demands and the application permits. Versatility is more readily achieved with an efficient antioxidant.

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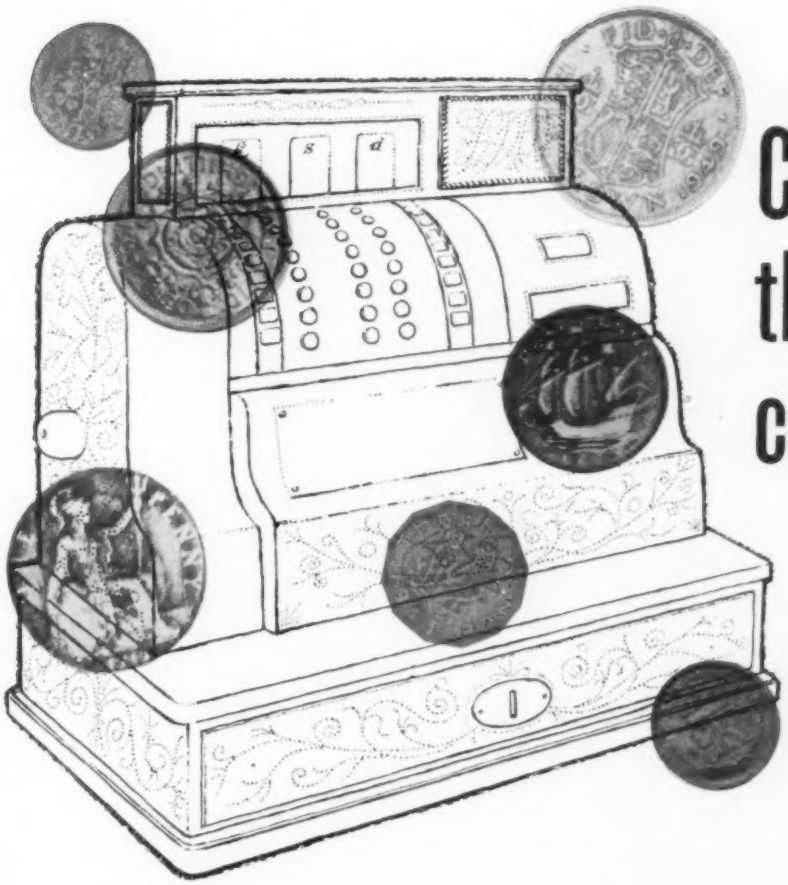
Advertiser's announcement. X196



Counting the cost

Some non-staining antioxidants may seem expensive in terms of purchase price per lb.—but this ignores the question of technical efficiency.

Calculating in terms of cost per unit of technical efficiency, a higher cost per lb. can well result in a lower cost per unit. A high degree of protection can only be achieved with an antioxidant of high technical efficiency. Further, an antioxidant of *high* technical efficiency can be used in *appropriate* dosages to obtain just the degree of protection required.

The I.C.I. range of non-staining antioxidants provides products of high efficiency suitable for a wide range of applications, whether the requirement is a high level of protection or low cost.

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refined benzene were consumed in this country in 1957, but the actual production from coal carbonization products was 120,000 tons in that time. A recently published report[4] contained the following production figures on chemicals extracted from coal tar, in 1,000 ton units:

	Actual	Potential
Cresols and xylenols ..	70	95
Naphthalene	57.5	170

However, an upsurge in demand might lead to more British activity in aromatic petrochemicals. A similar happening could be caused by increased costs in the coal industry, and coal in Western Europe is becoming more difficult to find and more difficult to win from the earth. The raw materials for a petrochemicals industry are available in greater bulk throughout the world, but, against that, there are no significant deposits in Britain so that this country is dependent on imports. There is no doubt, however, that the petrochemicals industry is potentially the more versatile, as displayed by the spectacular progress in America.

The rate of growth in this country has, of course, also been considerable. Recently published figures[5] show that the average growth rate over 1948-1958, in terms of production % per annum, was 46.5 for chemicals from petroleum against only 6.9 for the total of all chemicals. The total production in 1958 was over 600,000 tons, of which more than 400,000 tons was of organic chemicals.

Part of this would be directed towards the rubber industry apart from its chemical requirements, because the establishment of British synthetic rubber manufacture has led to demands for butadiene, styrene, acrylonitrile, all monomers which are derived from petroleum. The future already holds promise of butyl rubber, based on isobutene, and of cis-polybutadiene and cis-polyisoprene, both based on monomers from petroleum. Carbon blacks, both furnace and channel, are derived from petroleum, processing oils come from the same source, and, indeed, with the establishment in Britain of sulphur recovery from Middle East crude petroleum it is possible to visualize a vulcanized rubber entirely derived from petroleum.

An example is:

Butadiene-styrene polymer	100
Petroleum-based processing oil ..	5
High abrasion furnace black	50
Acetone/diphenylamine* antioxidant	2
Sulphur	3
Aniline*/butyraldehyde accelerator ..	3

**Presupposing a petrochemical source of benzene.*

A sheet of 4mm. thickness, vulcanized for 25min. at 153°C. had a tensile strength of 190kg/cm², an elongation at break of 320%, a 200% modulus of 120kg/cm², a BS hardness of 72°, and a resilience at 50°C. of 58%.

Difficult Reaction

The necessary raw materials have now been described. The next step is to put them together to make rubber chemicals, and this is not as simple as it may sound. It is easy to say that cyclohexyl benzthiazole sulphenamide is made by reacting cyclohexylamine with mercaptobenzthiazole. It is less easy actually to react these two intermediates. This is clear if reference is made to the patent literature. In one method,[6] an aqueous solution of the sodium salt of mercaptobenzthiazole is heated together with cyclohexylamine and water to 40°C., when 20% sulphuric acid is added slowly over 15min. During this time the temperature rises to 48°C., and the cyclohexylamine salt of mercaptobenzthiazole is precipitated in the form of a thick slurry. Water is added to make the slurry easier to stir. At this stage, the pH is 10.4.

Temperature Control

An aqueous solution containing sodium hypochlorite and a little sodium hydroxide is added drop-wise to the well-stirred slurry, maintained at a temperature of 48-50°C. After an initial slight drop, the pH rises gradually to 11.1, then falls sharply to 10.9, indicating the end of the reaction. Addition of hypochlorite solution is stopped. The resultant slurry is stirred for a further 10min. at a temperature of 45-50°C., and is then cooled to 25°C. The product is filtered off, washed free from chloride and sulphate ions with water, and dried for 16 hours at 50°C.

The manufacture of phenyl alkane antioxidants gives other examples. Phenyl alkanes are made by the reaction of 'suitably alkylated' phenols with an aldehyde. In one example,[7] a commercial coal tar fraction consisting of a mixture of dimethyl phenols is stirred with 35% hydrochloric acid, at 15-20°C., while n-butyraldehyde is added over 30min. After heating for three hours at 100-105°C., the mixture is cooled to 70°C. and formaldehyde added. A further heating of 45min. at 100-105°C. is given. The product is washed acid-free with water and steam-distilled at 130°C. under vacuum to remove low-boiling material.

To illustrate the various conditions within a class, here is one more example[8] of a phenyl alkane. This time the starting materials are formaldehyde and 4-methyl-6-tert. butyl phenol, the latter being made, for instance, by passing isobutylene into p-cresol in the presence of a catalyst such as zinc chloride and phosphoric acid. The 4-methyl-6-tert. butyl phenol is mixed together with concentrated hydrochloric acid and a little dispersing agent, all in heptane, and the mixture is agitated and warmed to 40°C. Aqueous formaldehyde solution is then added slowly, so that the temperature does not exceed 60°C. The reaction mixture is digested for three hours at 50-60°C., and is then cooled to 20°C. The solid product is collected on a filter, slurried in water containing a little dispersing agent, filtered once more and dried.

Forming Operations

These illustrations show how far short the simple statement of a reaction falls of practice. They indicate how much attention must be given to such factors as the control of temperature, of pH and of reaction rate. They also show that the process is by no means completed with the end of the reaction. The reaction produces the required chemical, but the chemical must be separated from the medium in which it was made, and then it must be washed free from impurity and dried.

There then come the finishing stages (not mentioned in the examples) which govern physical form, a consideration of growing interest to the rubber industry. These stages may include grinding and pelleting or other forming operations. If a chemical is to be sold as a powder, it is convenient for it to be produced in the right state of subdivision. Sometimes this is so, or it can be arranged to be so. Sometimes it is impossible, and grinding to a suitable fineness is necessary. There is, of course, an increasing demand for non-dusting products, which has introduced pelleting and other forming operations into manufacturing schedules, and has prompted the development of pastes for latex, based on chemicals of particularly low particle-size.

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[5]Williams, *Chemistry and Industry*, 1960 (32), 1006.
[6]Monsanto Chemicals Ltd. U.S.P. 2,762,814.
[7]Imperial Chemical Industries Ltd. B.P. 788,794.
[8]American Cyanamid Co. B.P. 677,584.

(To be concluded)

Q SRF Black from oil?

A

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FACTS

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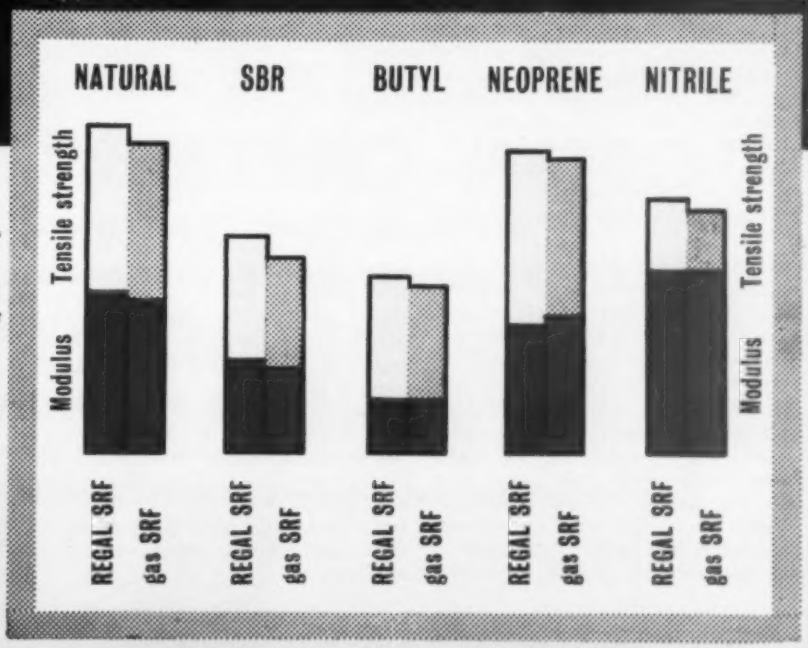
SRF



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Plastics for Satellite Optics

LIGHT-WEIGHT DEVICE MEASURES EARTH'S TEMPERATURE

ONE of the major instruments sent into outer space aboard a recent weather satellite is a two-channel radiometer. The satellite, Tiros II, is one of the latest in a series of experiments being conducted by the National Aeronautics and Space Administration in the USA.

The radiometer owes much of its success to an unusual application of plastics. In fact, except for its base-plate, a few resistors, some less-than-hair-thin platinum wire, and the two radiation detector flakes, the radiometer is practically all plastic. Even the conical optical elements, gathering infra-red and other radiation from earth to condense it on the detector flakes, are formed from a thin polyester film.

This material was selected because it has low thermal conductivity, is stable, strong, light, readily cemented to itself and metals, and easily vacuum-coated. Furthermore, the thin sheet will not de-gas, critical in the vacuum of outer space where the radiometer must function, and high-intensity random vibration does not harm the plastic film, so that the shock of take-off will not destroy the instrument.

Remote Thermometer

Acting like a remote thermometer, the light-weight radiometer measures the earth's temperature. Having two channels, the instrument also permits comparison between the total solar energy received by the earth, and the long-wave thermal energy emitted by it. Thus, meteorologists can get a measure of the earth's efficiency in absorbing solar radiation which is a major influence on our weather, and is being studied in the hope of making weather forecasting still more reliable.

Optics for the radiometer are cones constructed from 0.002in. polyester film. A shaped blank is held around a jig after a thin strip of polyester adhesive has been inserted in the seam and cured at 160°C. for about ten minutes.

When two cones have been prepared, they are secured to the radiometer's aluminium base plate with the same polyester adhesive in liquid form. The base has previously received a thin layer of polyester to act as insulation, and a thermistor head has been mounted in its centre to read base-plate temperature.

The outside surfaces of the cones are then vacuum-coated with aluminium.

The heart of each radiometer channel is a tiny thermistor detector flake, capable of absorbing radiation and changing in resistance as it heats up. These minute resistance changes are telemetered to monitoring stations on the ground. By comparing signals received from both the white and black channels, meteorologists can plot the earth's efficiency in absorbing solar radiation.

To minimize heat losses from the thermistor flakes, each is thermally insulated as much as possible from the rest of the radiometer. This is achieved by mounting them on grids formed by six .003in. strands of polyfilament acrylic fibres.

The technique for forming the grids is another example of clever design. A thin, .003in. washer of polyester, acting like a miniature embroidery hoop, holds the grid while it is tautly cemented into place, then reinforced with another, similar washer on top. The grid assembly is cemented to the top of the cone.

Thermistor flakes for the black and white radiometer channels are then carefully mounted on the grid. It has to be done carefully, because each thermistor trails a platinum lead wire, previously attached to it, only 0.0005in. thick, or about one-tenth the thickness of a human hair. Thermistor flakes are cemented into place with polyester, also used to tack the platinum lead to the cone after wrapping the lead around the acrylic grid a few times to prevent tearing when the satellite is launched.

Detector Flakes

Polyester discs are sized to seal off the cone end, and cemented over the detector flakes. Also, thinned liquid polyester is applied to the active side of the flake, to insulate it from the black or white paint to be applied later.

Now, gold is vacuum-deposited onto the back side of the two cones — the side facing towards the inside of the radiometer. The gold coating minimizes radiant heat transmission from the satellite itself to the detector flake that would cause erroneous readings.

Electrical connexions are made to resistors and to a special connector. In both cases, plastics again play an important role.

Because resistance values must be precise, standard production units cannot be used. Instead, each resistor is brought to its exact desired value by unwinding some of the resistance wire. To protect the finished resistor and to produce an insulated surface along which connecting wires may be run without shorting, a new jacket is made from polyester and cemented over the windings.

Applying Polyester

After a multi-pronged connector is cemented to the base plate and a chromel - alumel thermocouple is attached, the radiometer channels are calibrated in an environmental chamber. Remaining circuitry is completed, and electronic components positioned. Liquid polyester is applied to all wires and sensistors, and cured at 160°C. After one of the flakes has received a baked coating of a special white paint, the other black, the top of each cone receives a thin layer of polyester, and a final coat of gold.

It is safe to say that without the latest materials and up-to-date design engineering, this unique space-age instrument might have taken much longer to develop.

Two Antioxidants from I.C.I.

Nonox EXP, said to be a powerful new non-staining antioxidant, has been developed by I.C.I. Dyestuffs Division. The company recommends it for all applications involving white or coloured rubbers, such as white tyre sidewalls, flooring, wringer rollers, proofings and bathing caps.

Like its predecessor Nonox EX, the new antioxidant is a phenol condensation product but is in the form of resinous beads.

I.C.I. has also introduced Nonox SP, a mixture of styrenated phenols, for use as a non-staining antioxidant.

Hospital Equipment

The third International Hospital Equipment and Medical Services Exhibition will be opened on May 15 1961 by HRH the Princess Royal. It will be the largest of its kind ever held.

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VIEWS *and* REVIEWS

IT is reported that Ring Lardner, when asked how he wrote his short stories, replied that he first jotted down some isolated and widely separated words or phrases and then filled in the gaps between them. I think we could do with some technical writers working by the same method.

Reading by Proxy

The literature is now so vast and the rate of its increase is so rapid that no one engaged in a day-to-day job can adequately cope with it. We just cannot read it in the time available. There is no final solution to this problem but its difficulties can be reduced by employing someone to do some of the reading for us.

From time to time, I have referred to the need for new techniques in communicating technical information. Reading by proxy is not a new idea; 'abstracts' have been known for a long time but they lack something: aim, flavour, point, direction, even interpretation.

What we need is to be able to look somewhere and see a distillate of the recent literature with a finger pointing to the fraction which interests us, a sort of article with the Ring Lardner skeleton printed in red or in heavy type.

These reflections were induced by an excellent report in the American journal *Rubber Age* for January 1961 by Dr W. C. Wake of the Rubber and Plastics Research Association of Great Britain (Vol. 88, No. 4, pp. 676-683). It is an 8,000 word evaluation of the papers presented at the International Rubber Conference held in Berlin last October.

Digesting a Natural Block

I do not say that Dr Wake has done all that can be done, but he has got quite close to it. He has taken a natural block of scientific and technological papers and written a digest of them. He has done more. Quite rightly, he has permitted himself to comment on some of them, much to our advantage. Both Dr Wake and the editor of the *Rubber Age* deserve congratulations on their enterprise and achievement.

The industry needs explainers and interpreters like Dr Wake, because we cannot all go to the conferences (and, if we did, we should not understand all the papers). Dr Wake, by talent, temperament, and training, is particularly well suited to do this sort of thing. He has done it so well that he inspires me to suggest how it could be improved even further.

I am looking at the matter from the consumer's end, from the point of view of the man who wants to squeeze as much as he can out of the mass of talk which is a conference. I want an interpretation, directed to the things I am interested in, set down clearly, as simply as may be, and easily scanned and traversed. Just let the interpreter put the ideas down and I will pick my way through them, if he will make the roads straight and the signposts frequent.

You will object that no man can think for you. Of course not. You must make do with the best you can get and this means getting an expert to do it. So, for the papers of a conference such as the one in Berlin, I would want several interpreters, all experts in their fields. Thus there might be five: on Elastomers; Testing and Analysis; Fibres; Tyres; and Vulcanization and Reinforcement. Each author should be asked to discuss: (1) the general drift or trend of the conference, (2) the most important feature or features of the conference, and (3) the 'likely outsiders.'

Then I would ask an all-rounder like Dr Wake to sum up them all.

Editorially I would insist on plenty of sub-headings to permit ready choice by the reader of the subjects he wants to read about, and adequate references to the original papers, to permit the technologist to read them *in extenso*.

Consider the Reader

While I am on this subject of the techniques of passing on technical information, and while I have the January 1961 issue of the *Rubber Age* in my hands, I should like to point to the advertisements (by Goodyear Chemical Division on pp. 572, 3 and 4, by the J. M. Huber Corp. on p. 566 for 'Aktone,' by the Marbon Chemical Division for 'QXB-1' on p. 575, by the American Synthetic Rubber Corp. for 'ASRC 3106' on p. 582, by Union Carbide on pp. 588 and 9 for 'QXKV-2,' by Taylor Instruments on p. 592 for the Flex-O-Timer Controller), and ask whether authors of scientific and technological papers could not learn much from modern advertising techniques.

Saving Words

To make a rapid impact on the reader, to direct attention to salient points, to use charts and photographs in order to save many words, to use colour and size for facilitating the journeys of the eyes — all these devices would be useful in technical reports and are demonstrated in varying degrees by the advertisements I have named. They are distinctively different from the other two types of advertisement, one of which just shouts 'Buy Blank's Black,' and the other of which is a wordy, closely printed report in itself, perhaps with a would be attractive picture of a calender, a paper bag, or a blonde.

Is the time honoured method of the *literary* report now out-of-date, overtaken by the demands of a new age which needs to get, if not a quart into a pint pot, at least a 'sixty seconds' worth of distance run' into a minute? May I hazard a guess that what sustains it is a kind of educational snobbery which is afraid of losing face or dignity if scientific discoveries are communicated other than by the accepted speech of the literary gents. Scientific communication awaits its Graham Bell.

The Year Before Us

The January issue of the *Rubber Age* also has a review of the rubber industry in 1960 and a forecast for it in 1961, on pp. 627-634. 'We conclude that the rubber industry, as a whole, will experience a satisfactory year in 1961.' Sales will go up from 6.2 billion dollars to 6.5 billion. In the face of figures like these, I feel

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

like the Yorkshireman who was not overwhelmed — as he ought to have been, it was thought — by the billions of gallons of water tumbling over Niagara Falls, because he 'couldn't see owt to stop it.'

Points which particularly interested me in the analysis which preceded this conclusion were '. . . synthetic rubber will capture approximately 71% of the new rubber market in USA in 1961.' 'As for world consumption, this is expected to be at or near 3.8m. long tons in 1961, exclusive of Soviet Bloc figures. Of this total, some 37% will be synthetic rubber. It is generally agreed that the high cost of natural rubber throughout 1960 has forced a new turn to synthetic, not only in USA, but throughout the world.'

'Particular emphasis is being placed on the newer natural-synthetics. Brought into commercial production during 1960, the capacity for producing these 'stereo' rubbers in USA alone is expected to grow to 375,000 long tons annually by 1965. Productive capacity abroad, outside the Soviet Union, should reach 180,000 long tons by that time.'

'We may reasonably conclude that the new natural-synthetic rubbers will present more of a problem to natural than to the older types of synthetic.'

'The question most often asked revolves around the probable price of natural rubber under these new conditions. Will the advent of the natural-synthetic force the price of natural down? Many economists have concluded that, while the new synthetics will prevent rapid rises in the price of natural, they will not depress world prices. This is primarily due to the fact that world supply of natural is still short of world demand, and is likely to remain in short supply for the next few years at least.'

The Little Car

It is very interesting to see that the great number of so-called 'compact cars' (meaning the little ones we in Europe are used to) now in the USA 'pose a different set of problems for the tyre manufacturer. For one, he is now forced to produce a greater variety of sizes than heretofore, and this complicates production and the maintenance of proper inventories by dealers.' 'It is also pointed out that the dollar returns on each compact car tyre sold is somewhat less than for a standard tyre.' This is quite serious as 'compact cars currently represent some 30% of car production.'

Nevertheless, it is concluded that 1961 promises moderate improvement for the tyre industry, especially in the second half of the year.

The Fight for Foam

As in this country, latex foam rubber has not been doing so well because of the high price of latex and the inroads of the polyurethane foams. Although the plastic foams 'have made considerable headway in furniture and automotive cushioning' . . . 'they still have not captured the large part of the market represented by the bedding field.' *Rubber Age* concludes that there is room for both rubber and plastics foams, and that cost of raw materials is a dominating factor because 'let the price of latex come down and latex foam rubber will do well.'

While industrial rubber goods and footwear declined somewhat last year, conveyor belting 'bucked the trend' and adhesives did very well and 'should make new strides in 1961.'

The Year's Possibilities

A long supplement to the analysis of the year's possibilities consists of contributions from recognized leaders of the industry (including one from the UK by Stuart Covell, the director of the Federation of British Rubber and Allied Manufacturers).

George R. Vila, president of the US Rubber Co., speaks enthusiastically of the development initiative of his company. 'US Rubber expects to spend about $23m. for research and development. A major portion of this research investment will be in the development of new manufacturing processes, new fibres and more versatile rubbers and plastics.'

This company intends to be in the 'vanguard of the trend to increased use of plastics in cars. The average automobile in 1961 will use 30lb. of plastics and this figure could be doubled by 1965.'

'A most promising consumer product is Vyrene,' he adds, 'a new polyurethane thread, which will set new styles in both men's and women's fashions. An intensive world-wide expansion and promotion for this product is planned for next year.'

'US Rubber and Witco Chemical Co. Inc. have formed a new company called Sto-Chem Ltd. to construct a $2½m. plant for the manufacture of synthetic rubber latex in England,' he goes on. 'The plant will have a capacity of more than 8m. lb. of latex annually and is expected to go into operation in the fall of 1961.'

Mr Vila says: 'Particular emphasis will be placed on quality control through automation of our tyre production systems . . .' and Russell DeYoung, president of Goodyear Tire and Rubber Co., also points out: 'New synthetic rubbers and plastics, improved chemicals, tyre cord fabrics and adhesives, coupled with the latest scientific testing and quality control equipment, raised the quality of products to a new high during the year.'

Polydiene Rubbers

Goodyear also expect that their plant for the manufacture of polyisoprene, which they have named Natsyn, and their polybutadiene named Budene, will come on stream at the end of 1961 for use in tyres and industrial rubber products. Firestone parallel this with their Diene and Coral rubbers.

A. B. Leonard, of Phillips Chemical Co., 'a pioneer and continuing innovator in the field of synthetic rubber,' says that prices will determine how much *cis*-polydiene rubber capacity will be installed in the next few years, and he expects that there is a 'long period of relative price stability in the offing,' for one thing because polydiene plants can now be built in less than two years.

He ends on a note of optimism. 'Despite already imposing achievements, the field of polymer chemistry is still in its youth. Its horizon is unlimited. Another development unfolding in this field is the synthetic replacement of natural materials, such as gutta percha or balata, by *trans*-polybutadiene.'

CHARLES JENNINGS

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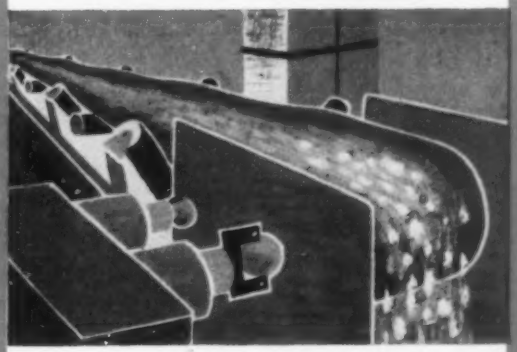
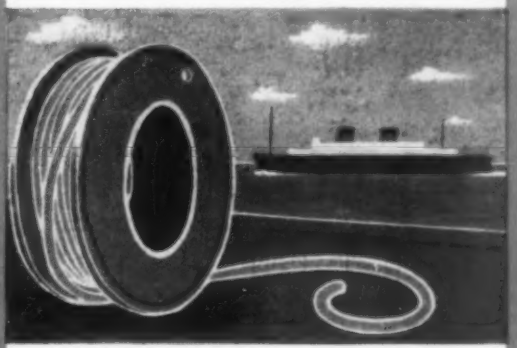


BUTYL FOR HEAVY INDUSTRY

This Butyl-covered conveyor belt at I.C.I., Billingham, has outlasted four ordinary belts and is still going strong.



BUTYL FOR ELECTRICAL INSULATION

Supertankers and liners have been wired throughout with Butyl-covered cable—lighter, smaller, (therefore less costly), with greater resistance to heat, ozone, moisture.

BUTYL FOR BUILDING

The building industry uses foam Butyl as a joint seal for gutters. It makes the perfect seal: easy to install, flexible, and absolutely waterproof.

MEN *and* MATTERS

A Review of People and Events

FOR his design of a portable, prefabricated plastics shower cabinet, B. M. Eccleston has won the 1960 Horners' Award competition for the most striking design in plastics by a young craftsman. Organized by the British Plastics Federation for the Worshipful Company of Horners, this competition is held annually to encourage young craftsmen in plastics and is open to residents of Great Britain or Northern Ireland.

Conscious of the thousands of homes in Britain without bathrooms, 32-year-old Mr Eccleston, of Selly Oak, Birmingham, believes there is a need for a shower cabinet that can be packed in a box, taken home and easily erected. Such a cabinet would also appeal to many old people who would prefer to take a shower rather than run the risk of getting in and out of a bath.

The winning design involves the use of commercially produced polyester/glass fibre or PVC sheetings which can easily be locked together, with PVC extrusions, to form the shower cabinet. The entire unit, including accessories, has been designed for production in various plastics materials.

Mr Eccleston is assistant chief product designer with BIP Chemicals Ltd., of Oldbury, Birmingham, and this is the first time he has entered the Horners' Award competition. The 100-guinea award will be presented to him at a forthcoming dinner in London of the Worshipful Company of Horners.

Fire-Fighting Down Under

Fighting forest fires in large and remote forest areas requires huge

by Peter Richards

quantities of water. Bringing this quickly to the scene of a fire which may be anywhere within an area of hundreds of square miles presents many difficulties, particularly in countries overseas.

The New Zealand Forestry Commission has recently solved this problem with 20 flexible rubber containers. The tanks, which carry up to 250 gallons, have the advantage of fitting easily into standard vans or trucks. They can be filled when in position or hoisted into position already full by means of a sling hoist. Filling takes 1min. 23sec. Each tank is fitted with a Hycar outlet sleeve to which a suction pipe of 4-6in. diameter can be attached, and thus can be emptied while still aboard the truck. When empty, the container can be rolled into a compass of 9in. The rolled container and its valve weigh only 30lb. and is easily handled by two people.

Tanks measure 7ft. x 5ft. 9in. empty and are made from a laminate of nylon and British Geon's Hycar nitrile rubber, which combines high mechanical strength with abrasion resistance. They are manufactured by Fireproof Tanks Ltd. of Portsmouth.

Forest fires in countries like Canada and New Zealand may rage for days, causing an enormous amount of damage. This flexible tank which fits into a standard van or truck increases the mobility of fire-fighters and is having a great success in New Zealand *(see Fire-Fighting Down Under)*

RTA Chairman

S. N. Whitehead, chairman of the Rubber Trade Association, the annual meeting of which appears elsewhere in this issue, has been connected with the rubber industry since 1912, when he joined Gow Wilson and Stanton Ltd., tea and rubber brokers. After service in the first world war he spent some years in the Far East as buyer for The Goodyear Tyre and Rubber Co., returning to this country in 1921 to C. Hirch and Co. Ltd., who are the London buying agents for Goodyear.

Chairman of this company since 1956, Mr Whitehead has had a long connexion with the Rubber Trade Association on its various sub-committees, becoming vice-chairman in 1959 and chairman in March 1960. He attended the International Rubber Study Group Conference in Kuala Lumpur last year on behalf of the Board of Trade.

Perstorp Sales Director

Harry Davey, sales manager of Perstorp Products (GB) Ltd., of Orpington, has been appointed sales director. He joined the firm six years ago as office manager and accountant.

Perstorp is said to be the largest importer of plastic laminates in the UK. Founded eight years ago by Edgar Richardson, it is a subsidiary of Skänska Attikfabriken, of Perstorp, Sweden, the largest plastics factory in Scandinavia.

Portable Beauty Parlour

Door-to-door salesmen are one of the busy housewife's occupational hazards. One of the most tempting must be the Avon representative who

carries 'a beauty parlour into your home.' She advises the housewife on which make-up to use for her complexion, and on how to conceal the odd middle-aged wrinkle.

The portfolio that carries this portable suburban beauty parlour is almost entirely made of plastics. The display unit and lid are moulded by Stewart Plastics of Croydon, using British Resin Product's Styron polystyrene. The portfolio itself is PVC covered, and containers for some of the cosmetics in the range are moulded from I.C.I's polythene by Blewis and Shaw Ltd.

The New Men at Strasbourg

Polymer Corp. has announced a number of appointments to the French company which it has formed in Strasbourg to run its first European synthetic rubber plant (Issue Feb. 4, 170).

A. R. Powell, who becomes plant manager, joined Polymer in 1942 as a chemical engineer in production control. In 1959 he was made production superintendent of the rubber department at Sarnia.

The chief accountant of the new company, J. H. Watt, is a native of Glasgow, who has been assistant chief accountant at Sarnia since 1951.

J. R. Ardagh, an economist who has been working on the project in France for some time, has been appointed staff assistant to the general manager. R. J. Adams has been made administrative assistant to R. E. Hatch, president of Polymer Corp. (SAF), and Stanley P. Loos, at present assistant supervisor of the copolymer department at Sarnia, has been appointed production superintendent of the new plant.

Appointments in Brief

C. G. Erlam has been elected chairman of Palmer Aero Products. P. L. Watson and J. A. Hemingway have been appointed directors. The company is a subsidiary of BTR Industries.

* * *

John Creek has been appointed deputy managing director of Fibreglass Ltd., in addition to his present position of sales director.

* * *

Major F. D. Outridge has been appointed assistant to Capt. R. A. Villiers, director of the Scientific Instrument Manufacturers' Association.

* * *

L. B. Chappell has been appointed transport and purchase casings manager of Blue Peter Retreads Ltd.

THE LEGAL ANGLE

Poaching Staff

By a Barrister

'I spend a lot of money on training in staff — particularly on the research and technical service side. I regard it as an investment in my rubber and plastics firm and, in general, it has been money well spent.'

So you should. It is the only way to build up a first-class staff.

'Not quite the only way. There is another. You can do what a certain rival company has been getting up to; that is, you can acquire your staff by stealing them from others, ready trained.'

Have you lost many people this way?

'Yes. And I would like to know whether there is anything that the law can do to stop it?'

In general, just as every servant is free to change his job, to better himself, to climb the ladder to wealth and distinction — so every employer is free to attract to himself the best possible servants. You want expert technicians, technologists, research workers? Then you have to pay for them — and the fact that they have been trained elsewhere is the bad luck of the person who trained them.

'Do you mean to say that competitors can march into my factory and poach my staff and the law will not help me at all?'

Well, you do not have to let them on to your premises if you do not wish to. If you refuse to allow them to come in, then they will be trespassers if they come across your doorstep, although you cannot prosecute them for trespass, no matter what your signs may say; and you will not get much damages from a court, were you to sue them.

Help in One Circumstance

'But what if they do acquire your staff?'

The law will help you in one circumstance only. Your competitors are quite free to entice your staff away, but they are not entitled to induce your employees to break their contracts of employment with you. In other words, if your servants give their proper notice, they have not broken their contracts of employment and the person who induced them to leave you — no matter what his reason — has committed no offence in law.

'But if no notice is given?'

Then the employees will be in breach of their contracts of service and the employer who enticed them away will be guilty of 'inducing breaches of contract.'

'What can one do about it?'

Sue. First, you will be entitled to an injunction — an order of the Court forbidding the offending competitor from doing the same sort of thing again — provided that you can show that, unless restrained by order of the court, he is likely to repeat the mischevious process.

Claiming Damages

'And if you can show many instances in the past, that should be easy?'

Yes. And then you will obtain damages, if you can prove actual financial loss suffered as a result of this behaviour. Not easy to do, in practice: even if your profits have dropped off, you may find it hard to show that there were no other causes. But the cost of training in a new employee might well be recoverable.

'So the answer to my question is — if my staff give proper notice, I am powerless. But if they do not, I will have a cause of action.'

Yes.

'And if I received notice — of the requisite length — in every case, there is nothing I can do . . .'

Right again . . . unfortunately.

Polly Ester Says . . .

'Common Market — common? If it's good enough for I.C.I., it's good enough for me'

Yet another PVC stabilising problem solved with

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Flexible Ducting

PVC COATED FABRICS IN MINE VENTILATION

By C. G. ANDERSON
Ventilation Tubing Co. Ltd.

THERE are undoubtedly many people outside the mining industry who are not aware that a great deal of air for the ventilation of mines is carried by flexible ducting made from textiles coated with PVC.

This ducting is made in lengths of 25, 50 and 100ft., every length having a spring steel wire coupling ring sewn or welded into each end. Brass eyelets are spaced at one yard intervals along each length, so that the duct can be supended from a wire which runs through the mine tunnel, near the roof. The lengths of ducting are coupled together by squeezing the ring on one end into an oval shape and pushing it inside the next length. On being released, the ring regains its circular shape and, since it is the same size as the ring on the other length of ducting, it locks in position forming an air-tight joint. The greater the air pressure inside the duct, the tighter the joint becomes.

Examining a 24in.-diameter Venco ventilation duct, built from Courtauld's high-tenacity rayon and British Geon PVC

No Mechanical Supports

The ducting has no mechanical supports to hold it in shape but is held open simply by the pressure of air inside it. T pieces, Y pieces and elbows are made from the same material and coupled in the same manner. Reducing pieces are also made for coupling ducts of different diameters. The diameter of the ducting varies from 12in. to 30in.

Air is blown through the ducts by large fans with capacities of many thousands of cubic feet per minute. At the New Lea Hall Colliery, in the National Coal Board's Cannock Chase Area, nearly six tons of air will be circulated through the workings for every ton of coal extracted. Approximately 5% of this air will be carried by flexible ducting.

In addition to the standard type of ducting, which can be used only for blowing, a certain amount of dual purpose ducting is employed which can be used either for blowing or for suction. This is supported either by additional spring steel rings, closely spaced along its length, or by a spiral spring steel wire.

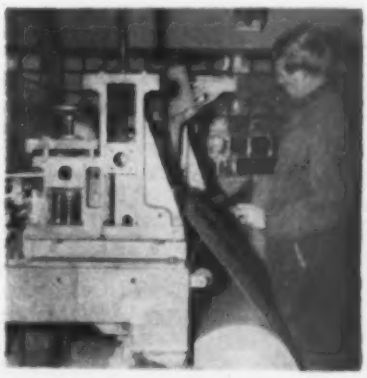
The main use for this type of ducting is to suck away the dust, from the area close to the working face, after shot-firing. It has the advantage over rigid ducting that it can be folded concertina-wise to remove it from the vicinity of the shots being fired and can quickly be returned into position for removal of the resulting dust. It can also be used for removing air containing mine gases, such as firedamp, from the workings.

When men are working miles underground it is essential that a reliable supply of fresh-air is maintained. Before the last war, all flexible ventilation ducting was made from hessian or cotton fabrics coated with rubber. These were inflammable, had poor tear strength and were subject to deterioration by perishing of the coating and rotting of the base fabric.

A few years after the last war the more enlightened manufacturers began to change over to PVC coated fabrics. After nationalization, the National Coal Board, now the biggest consumer of flexible ventilation ducting, had started a drive for greater safety in their mines and this included the elimination, as far as possible, of all inflammable materials underground. In 1956 NCB Specification P.132 was introduced for Fireproof Brattice Cloth, setting a very high standard for fire resistance and the following year Specification P.154 for Flexible Ventilation Ducting was published.

This specification contained very stringent tests for the tear and tensile strength of the fabric used, as well as a leakage and pressure test and a deformation test on the coupling rings. It also specified that, where fireproof ducting was called for, the material should comply with the Brattice Cloth specification.

The production of a fabric to meet these specifications was a difficult problem. In order to maintain satisfactory air tightness in use the fabric must be coated on both sides since, if it is coated only on one side, any abrasion to which the ducting is subjected removes the coating and causes a leak. Since it is inevitable, under working conditions in a mine, that the



Coating the fabric with PVC. The formulation of the coating plays an important role in the retention of tear and tensile strength of the fabric

ducting will be abraded it must be coated inside as well as outside.

Coating a fabric on both sides causes a considerable reduction in the tear strength by locking the threads so that instead of six or seven threads helping to take the strain of any tearing force the strain is applied to only two or three threads.

To achieve adequate fireproofing a minimum ratio of PVC to fabric is required but the more coating is applied the more the threads are locked. Locking of the threads is also affected by the flexibility of the coating and the amount of penetration of the coating into the interstices of the fabric.

Fabric Tenderization

The tear strength can also be affected by tenderization of the fabric either by migration of plasticizer from the coating to the fabric or by hydrogen chloride gas evolved from the PVC during gelling. The latter fault is caused by inadequate heat stabilization of the plastisol used for the coating and this is dependent on the polymer which is used and, to some extent, on the plasticizers. If chlorinated paraffin extenders are used these also liberate hydrogen chloride when heated and this must be taken into account when stabilizing the plastisol. The gelling time and temperature must also be rigidly controlled, as a level of stabilization, which will prevent the liberation of hydrogen chloride when the material is heated for a given time at a given temperature, may be quite inadequate if the time or the temperature exceeds these values by a fairly small margin.

The finished fabric must be a compromise between these various opposing properties but, even when the best compromise is reached, to achieve maximum strength coupled with adequate fire resistance it is necessary to use a base fabric which, in the loomstate, is much stronger than the figures called for by the specification.

Three Years' Research

Venco fabric supplied by the Ventilation Tubing Co. Ltd. is one of the fabrics which have consistently complied with the Coal Board specifications since their introduction. Made from Courtaulds Tenasco Tyre cord yarn woven into an 8oz. fabric with a PVC coating based on Geon 121, supplied by British Geon Ltd., this fabric is the result of three years of research into the best type of weave and coating to comply with the fireproofing requirements and retain the maximum tear and tensile strength. During the period October 1959 to September 1960 over 75 miles of this ducting were supplied to the home and overseas markets and for the year commencing October 1960 the company expects to produce over 100 miles.

Hessian is still used, to some extent, as a base for flexible ventilation ducting but although it is cheaper, weight for weight, than rayon, more weight is

PVC-coated rayon being tested for flame resistance in accordance with NCB Specification P.132

needed to produce a fabric of the same strength and the heavier the fabric, the more PVC is required to render it fireproof.

Nylon and Terylene have also been used but it is doubtful in the writer's opinion whether they will ever compete successfully with rayon in this field, except for certain specialized uses and for export to Africa and other tropical mining areas. Fabrics woven from these fibres and having the same strength as the Tenasco one are much more expensive. In addition, it is difficult to achieve satisfactory adhesion of the coating to these materials and although they are much lighter to handle, both in making up and in use, it is considered that their use can only be justified where the special properties of these fibres are essential to enable the ducting to be used in highly corrosive conditions.

CHEMSTRAND EXPAND

Chemstrand Ltd. has announced that its £3½m. acrylic fibre plant at Coleraine, Co. Londonderry, is to increase production capacity immediately by 50% from 10m. lb. to 15m. lb. a year.

This is said to be the first phase of a two-phase expansion plan and will be completed by mid-autumn of this year. Engineering design work has also been started to increase capacity to 25m. lb. a year by the end of 1962.

The first phase will increase the firm's initial employment target of 400 by at least 17% and the second phase by at least 38%.

East German Order for R. H. Windsor

R. H. Windsor Ltd. has received an order worth £53,000 from East Germany for the largest in their range of injection moulding machines, the AP 335.

Weighing 73 tons, the AP 335 is capable of moulding articles up to 210oz., such as refrigerator linings and radio cabinets.

R. H. Windsor, which is taking 1,200 sq. ft. at the Leipzig Spring Fair, says that the AP 335 is the largest machine of its kind the East Germans have bought so far. The Leipzig Fair is from March 5-14, and has the largest ever UK participation. Over 200 British firms will participate.

Pigments Expansion

Johnson Matthey Ltd., pigment producers, who recently became associated with Cowan Brothers Ltd., is re-siting two factories in Burslem on a 14-acre plot at Kidsgrove, Staffs., where a new plant is being constructed. The plant will cost over £200,000.

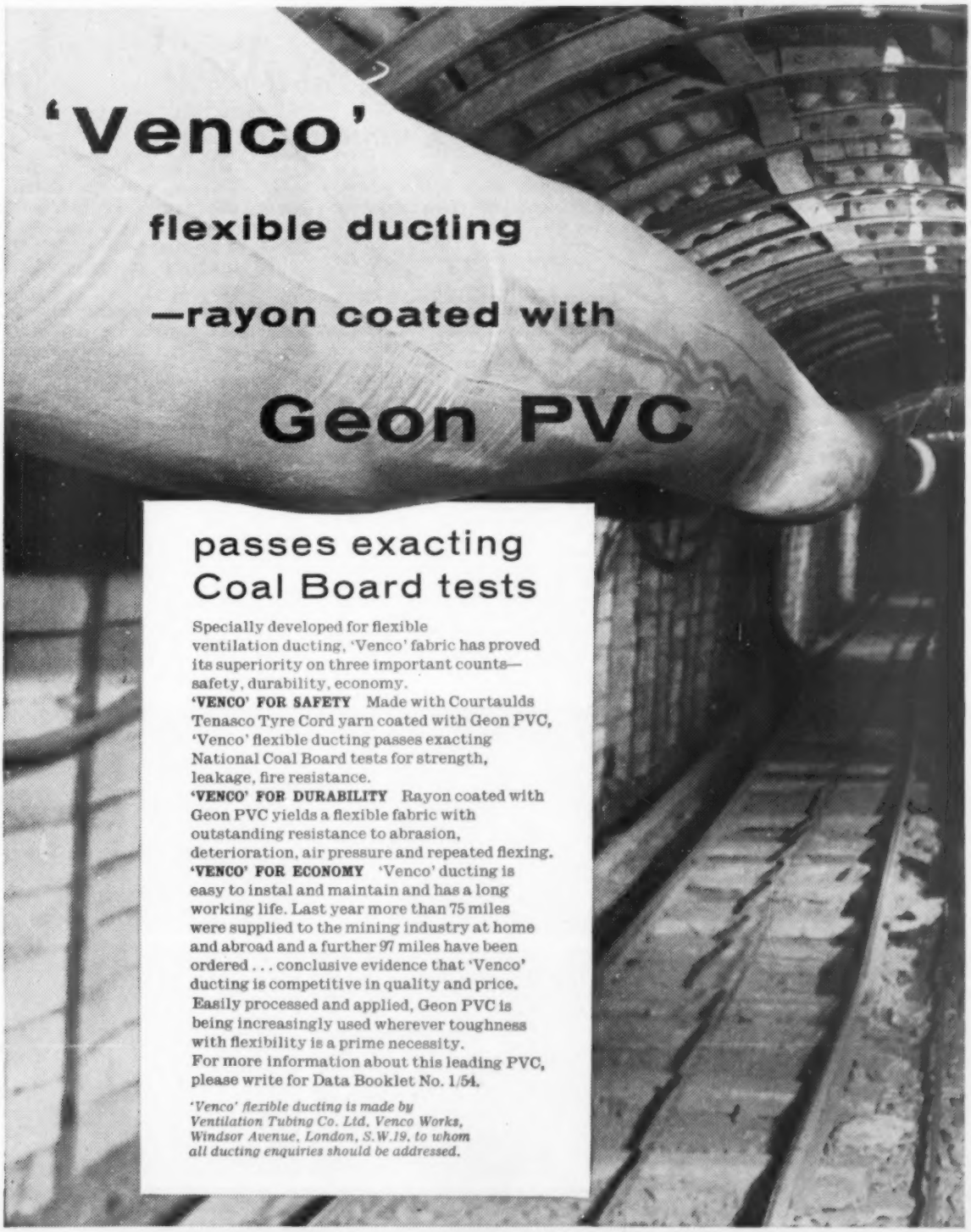
Floor Covering Discharges Static

A floor covering has been developed by Phoenix Rubber Co. Ltd. which is said to eliminate the build-up of static electricity.

Phenguard, as it is called, is made by compounding minute particles of carbon black which conducts the electricity to a 2in. strip of brass foil laid under the floor covering. The brass foil, in turn, channels the electricity harmlessly to earth.

The covering is made in two classes — one specially for hospitals and the other for commercial purposes. The hospital grade is sufficiently conductive to discharge static electricity to earth while remaining resistant enough to act as an insulator against low tension currents. The industrial grade gets rid of static by rapid dissipation in circumstances where protection against low tension shock is not necessary.

'The secret of the material,' says Phoenix, 'lies in the way in which the minute particles of carbon black are distributed evenly throughout the 'mix' of Phenco. Were the particles unevenly distributed there would be a break in the chain of conductivity which would result in lessened efficiency.'



passes exacting Coal Board tests

Specially developed for flexible ventilation ducting, 'Venco' fabric has proved its superiority on three important counts—safety, durability, economy.

'VENCO' FOR SAFETY Made with Courtaulds Tenasco Tyre Cord yarn coated with Geon PVC, 'Venco' flexible ducting passes exacting National Coal Board tests for strength, leakage, fire resistance.

'VENCO' FOR DURABILITY Rayon coated with Geon PVC yields a flexible fabric with outstanding resistance to abrasion, deterioration, air pressure and repeated flexing.

'VENCO' FOR ECONOMY 'Venco' ducting is easy to instal and maintain and has a long working life. Last year more than 75 miles were supplied to the mining industry at home and abroad and a further 97 miles have been ordered . . . conclusive evidence that 'Venco' ducting is competitive in quality and price.

Easily processed and applied, Geon PVC is being increasingly used wherever toughness with flexibility is a prime necessity.

For more information about this leading PVC, please write for Data Booklet No. 1/54.

'Venco' flexible ducting is made by Ventilation Tubing Co. Ltd, Venco Works, Windsor Avenue, London, S.W.19, to whom all ducting enquiries should be addressed.

Photograph by courtesy of the National Coal Board.

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PI and IRI Co-operation

IRI LONDON SECTION ANNUAL DINNER AND DANCE

MORE than 300 people enjoyed the London section of the Institution of the Rubber Industry's annual dinner and dance, which was held at the Café Royal, London, last week.

Proposing the toast of the London section, Dr F. P. Hiron, chairman of the Plastics Institute London section, said that his invitation reflected the increasing amount of co-operation between the two industries. He cited the fact that the Research Association of British Rubber Manufacturers had become the Rubber and Plastics Research Association, and added that it was no secret that a joint committee was studying the possibilities for closer liaison between the Institute and the Institution.

On this theme, G. N. Welding, chairman of the IRI London section, said that joint meetings between the London sections had met with great success. He announced that it had been decided to revive the section's autumn dance, which would be held at the Victoria Hall, Bloomsbury, on October 20.

Mr Welding welcomed George Martin, chairman of the IRI Council, and Mrs Martin, and paid tribute to the hard work carried out by R. H. Craven in organizing the function.

J. A. Stephens proposed the toast of the ladies, and Mrs G. N. Welding responded.

Among those present at the highly successful IRI London section annual dinner and dance were (pictured below, left to right): 1. Mrs Hiron, Dr F. P. Hiron (chairman, Plastics Institute, London section), Mrs Welding, G. N. Welding (chairman, IRI London section). 2. P. C. Bell (Belpar Rubber), M. R. Ward (British Geon). 3. Mrs Craven, R. H. Craven (IRI), S. E. Bolam (Witco Chemical), Mrs Bolam. 4. Mrs Wynne, Mrs Dyke, G. N. Dyke (Francis Shaw), C. G. Wynne (J. G. Ingram). 5. A. Fiber (Du Pont), Mrs Fiber, R. G. Paterson (Du Pont), Mr Trexel (Du Pont), Mrs Trexel. 6. K. Peachey (Veedip), Miss Thomas, S. Jonker (Veedip), Mrs Jonker. 7. H. R. Surridge (Surridge Patents), J. Miller (Surridge Patents), D. Oliver, S. A. Parr (Hytex), N. Hillson. 8. G. H. Yardley (Veedip), Mrs Yardley, S. D. Sutton (Veedip), Mrs Sutton. 9. Mrs Larkin, R. W. Larkin (London Rubber).

IRI Golf

SCOTTISH SECTION

Fixtures for the Scottish Section of the Institution of the Rubber Industry Golfing Society for 1961 are:

April 12: Captain's Prize and Southerness Tankard at Helensburgh; May 11: Scottish Challenge and Wallwork Qualifying Round at Kilmacolm; May 24: PI v. IRIGS at Hilton Park; June 10/12: Wallwork Final and Section Matches at Gleneagles; September 2: V. Captain's Prize and East v. West Match at Dunblane; and September 14: IRIGS v. PI at Balmore.

Plastics Statistics

JANUARY EXPORTS AND IMPORTS

PLASTICS exports showed an encouraging rise during January 1961. A total of 18,409 tons compared with 14,241 tons in December 1960 and 14,525 tons in January 1960. The value was £4,317,988 — £3,446,134 in December 1960 and £3,874,213 in January 1960. These figures are given in the official Trade and Navigation accounts, which show that by far the biggest quantity was taken by Sweden (2,236 tons), followed by the Netherlands (1,119), Australia (919), India (802), and Hong Kong (765).

Imports during the month were 6,837 tons valued at £2,392,779, compared with 7,517 tons (£2,389,307) in January 1960. USA was the major supplier with 1,897 tons, closely followed by Western Germany with 1,873 tons. Italy supplied 798 tons.

Details of imports of plastics materials during January 1961:

	Tons	£
Acrylics	309	112,758
Alkyd solid and liquid resins, solutions, emulsions and dispersions	199	40,816
Cellulose plastics:		
Acetate butyrate	147	161,706
Photographic (including cinematograph) film base (except acetate butyrate)	166	229,221
All other	149	113,375
Polyamides	366	256,117
Polystyrene	236	74,637
Polyvinyl chloride:		
Polymers and copolymers	1,994	290,264
All other	667	224,687
All other	2,604	889,198
Total	6,837	2,392,779

Exports of plastics materials during January 1961:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	894	532,362
Alkyd solid and liquid resins, solutions, emulsions and dispersions	487	94,954
Aminoplastics:		
Solid and liquid resins, including solutions	1,218	131,044
Moulding and extrusion compounds	816	147,196
Cellulose plastics:		
Moulding and extrusion compounds	304	94,682
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	164	108,539
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	762	185,496
Other	815	269,569
Polystyrene	1,459	289,669
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	150	62,392
Polyvinyl chloride:		
Polymers and copolymers	1,628	217,484
Moulding and extrusion compounds	1,564	307,349
Sheet	794	286,865
Other	96	25,258
All other	6,635	1,502,676
Waste and scrap (including celluloid and film waste and scrap)	623	62,453
Total	18,409	4,317,988

UK exports to countries in the European Economic Community (Common Market) and the European Free Trade Association are shown below.

EXPORTS TO EEC

	Jan. 1960	Jan. 1961
Western Germany	352	482
Netherlands	586	1,119
Belgium	447	691
France	415	474
Italy	439	624
	2,239	3,390

Exports to Commonwealth countries during the month were 4,604 tons (5,028 in January 1960) and exports to all other foreign countries were 5,711 tons (4,360 tons).

EXPORTS TO EFTA

	Jan. 1960	Jan. 1961
Sweden	1,015	2,236
Norway	371	643
Denmark	545	776
Switzerland	502	529
Portugal	328	410
Austria	232	110
	2,993	4,704

(Any apparent discrepancies are due to rounding off of figures)

Rubber Statistics

UK — SWITZERLAND

CONSUMPTION of natural rubber in the UK in December of 13,735 long tons compared with 13,838 tons in November, according to the International Rubber Study Group.

UK imports of natural rubber, excluding deliveries from the Government stockpile, amounted to 17,557 long tons compared with imports of natural rubber in November of 16,102 long tons, excluding deliveries from the stockpile. UK re-exports in December reached 1,981 long tons of natural rubber against 4,820 in November.

Stocks of natural rubber held by manufacturers and in warehouses at the end of December totalled 33,537 long tons, exclusive of Government stocks, against 28,798 long tons at the end of November.

Switzerland

Swiss rubber imports in January totalled 1,771,415 kilos compared with 1,240,448 kilos in January 1960, according to the Swiss Customs Directorate. Details were as follows (in kilos):

	Jan. 1961	Dec. 1960	Jan. 1960
Raw rubber	617,854	632,286	447,770
Synthetic rubber	1,003,339	821,199	767,393
Regenerated rubber	39,480	12,066	904
Scrap rubber	110,742	51,458	24,381

Main suppliers of raw rubber in January 1961 were Malaya with 539,683 kilos, Indonesia with 50,800 kilos, Ceylon with 20,320 kilos, and Italy with 5,024 kilos. Main sources of synthetic rubber were the US with 736,567 kilos, Canada with 120,353 kilos, West Germany 76,663 kilos, France with 30,208 kilos, the Netherlands with 29,288 kilos and Italy with 10,260 kilos.

Regenerated rubber was chiefly supplied by France (20,000 kilos), the UK (16,964 kilos), and Italy (2,516 kilos), while scrap rubber came mainly from France (66,940 kilos) and West Germany (43,802 kilos).

COMPANIES in the NEWS

Pataling Rubber

Pataling Rubber Estates proposes a final dividend of 45% to make 60% for the year ended October 31 1960, on a capital increased by the Jugra Land and Carey acquisition.

The year's dividends on £1,158,312 capital absorb £425,680, compared with £250,428 required to pay 55% on £743,386 previously.

Group profits, including those of Jugra for 11 months and of the Strathisla estate, acquired November 1 1959 for 12 months, amounted to £1,182,467. In the previous year the parent's profit was £789,091. Jugra became a wholly-owned subsidiary on May 30 1960.

Tax takes £426,417 (£250,477), leaving a net profit of £756,050, compared with £538,614.

COMPANY MEETING

The Rubber Trade Association of London

CHALLENGE FROM NEW SYNTHETICS — A WARNING

Mr S. N. Whitehead presents strong case for Natural Product

THE annual general meeting of The Rubber Trade Association of London was held on February 28 at the Rubber Growers' Association, 19 Fenchurch Street, London, E.C.

Mr S. N. Whitehead, the chairman, who presided, said:

When my predecessor passed the baton to me in March 1960, the rubber market had not fully recovered from the acute shortage of supplies to which he referred at the annual general meeting. This was in spite of the fact that the UK stockpile had sold since October 1959, 30,921 tons and the US stockpile 47,556 tons. By the end of 1959, the statistics showed a deficiency of natural rubber production from consumption of 45,000 tons and these deficiencies continued month by month until June, making a total of 75,000 tons for the first half year of 1960. During this period, the UK stockpile sales were 37,973 tons. Thenceforward the tide began to turn, mainly due to a recession in consumption.

Price Variations

The peak of prices occurred in May when the highest price reached for Spot Standard RSS was 42d. and for the current month's shipment cif, 39½d.

Since the month of June, prices have steadily declined with only minor reactions until, to date, the lowest level that has been reached was 23⅜d. for Spot and 23½d. for the current month's shipment cif.

I think that the London Rubber Market can be congratulated on having come through this difficult time and met all its commitments without encountering any serious financial troubles.

But no one would contend that this has been a satisfactory state of affairs. As has been said so often, these wide price movements do nobody any good, in the long run not even the producers, least of all the consumers, and they only provide anxiety to the markets. But I would like here to quote my predecessor who opened his speech with the following words:

> 'During 1959 the rubber industry has faced the most acute shortage of supplies of natural rubber for 50 years. . . .'

He went on to add that he was excluding the periods of artificial stringency created in 1925/26 by the Stevenson Scheme and by the effect of stockpiling in 1950/51.

No doubt the rubber producing industry has learned its lesson about restriction schemes but stockpiling in rubber is a post-war innovation and perhaps its implications have not always been fully appreciated.

Effect of Stockpiling Programme

Between the years 1950 and 1959 the total world stocks of natural rubber, excluding those Government owned, were reduced by 37,500 tons. At the end of 1959, the free warehouse stocks in the UK were only 4,388 tons and stocks in dealers hands in New York were 12,745 tons. Yet throughout this period there were substantial surpluses of new production over consumption amounting, in total, to 855,000 tons. It is obvious, therefore, that the effect of the stockpiling programmes had been to reduce the working stocks of the world's markets, other than Singapore, to a point where they were grossly inadequate for normal market needs. No doubt these programmes were necessary at the time, with the recollection of the acute seriousness of rubber supplies during the war, the political tensions that still existed and the Korean war. But when the finger is pointed at the free markets for their inability to maintain reasonably stable prices, it should be remembered that the rubber market during this period was not really free, in that the whole of the surpluses were taken out of the market for the Government stockpiling purposes and frozen.

The rubber markets of the world have suffered acutely from this starvation of stocks, particularly London as an entrepot market serving the world, and providing terminal hedging facilities.

A Stabilizing Factor

Adequate stocks are always a stabilizing factor in any market. They provide the necessary cushion between the constantly varying rates of supply and demand. Without them, reaction to every change in the situation is exaggerated. The shortage of free stocks and the existence of the heavy frozen stocks also forced a false price structure on the market. The real position was obscured, the effect of surpluses removed and concern over shortages diminished by the heavy shadow of the Government stockpiles.

I believe that this has been the major factor in the difficulties of post-war trading in the London market and in preventing it regaining its full importance as the main entrepot market of the world.

Since October 1959 the process has gone into reverse. Both the US and UK Governments decided to liquidate part, or in the case of the UK, the whole, of their stockpiles. At the time, the decision came as a welcome relief to a market that was, as we have seen, suffering from an acute shortage of supplies, but in the last few months this situation has changed almost dramatically and the rubber growing industry and the markets have to face not only what we hope is a temporary recession in business, but entirely new factors.

Control of Demand and Price

During the post-war period, demand, and therefore the price of natural rubber, has been controlled by the gap between normal or maximum possible usage of synthetic rubbers and total consumption. The consumption of synthetic rubber has been governed not only by its quality in regard to satisfactory end-product usage. In the USA this has been the main factor but in other countries it has depended also upon local production or the availability of dollars to pay for US synthetics. Both of these have been limiting factors until recent years when the increase in local production has grown and is slowly bringing the relative percentages of natural and synthetic closer to those in the USA.

Over a period, the increase in the total consumption of all rubbers has left this gap wide enough to take the whole of the production of natural rubber. It has indeed become to be taken for granted by natural rubber producers that they would always find a market for their products, irrespective of price. In the near future, however, this position is going to be changed by the production of the new stereo-regular rubbers. It can, I think, be taken as an accepted fact that so far as quality and performance are concerned, the new polyisoprenes can replace natural rubber 100% and the new polybutadienes to the extent of 50%, though the latter could, and no doubt will, be increased.

Effect of New Rubbers

We have to face the fact, therefore, that these new rubbers (and we can really call them rubbers since they have the same molecular structure as natural rubber and possess the same qualities) could fill the gap on what natural rubber has, during recent years, depended for its market. It is clear, therefore, that in the next few years the natural rubber producer cannot depend upon the sale of his commodity by its quality alone. It will be a matter of economics. In this field, it would appear that natural rubber has a very strong case. Even at the present time and price, natural rubber can be produced at a good profit. Owing to the farseeing replanting schemes that have been carried out by the majority of estates in Malaya and

also in a lesser degree by smallholders, increased areas of high-yielding stocks are yearly coming into bearing which will have a considerable effect on the cost of production. So that in the next three to five years, they will be in a still stronger position to meet the price competition of the new stereo-regular rubbers. There would seem at present to be grave doubts as to whether the cost of production of these new synthetics can, in the foreseeable future, be reduced to meet this competition. The outlook, therefore, for natural rubber producers does not appear to be too black; indeed, the problems of the near future may not be all on the side of the natural rubber producer.

As we have seen, the present recession plus the liquidation of stockpile rubber has created a surplus which has caused a heavy drop in the price of natural rubber. This does not help the general purposes synthetic producers, many of whom are the large tyre manufacturers, particularly in the USA. The present and potential producers of the new stereo-regular rubbers will largely follow the same pattern and their products may come into commercial production at a time when natural rubber is already providing keen competition on a price basis. The old general purpose synthetics may therefore be faced with competition both from natural rubber and the new stereo-regulars. Added to this, the problem of the disposal of the Government stockpiles must also bring its perplexities. Under the present agreement with the producing countries, no stockpile rubber is being sold at the present price level. So far as the UK is concerned, the amount left is not sufficient to be significant and the Board of Trade are to be congratulated on having taken full advantage of a fortunate situation to dispose of the greater part of it at prices that must have given them considerable satisfaction; but the US authorities are not perhaps in such a happy position. They may well be anxious to rid themselves of the incubus of as much of their stockpile as possible and as quickly as possible but, on a market already bending under the burden of a surplus, further liquidation would worsen this situation and further embarrass the synthetic producers. Nevertheless, the possibility of a change of policy cannot be ignored.

Thus we can see that the rubber industry is entering upon yet a new phase which is fraught with problems for both sides of the industry and the markets who seek to serve them.

Positive Achievements

Among the positive achievements during this year can be counted the successful outcome of the Third International Packing and Quality Conference which was held in Singapore in September 1960. The main purpose of this Conference was to try to reach agreement in the elimination of overlapping RMA and Singapore grades and to substitute a complete range of international grades covering all the types and qualities of rubber normally traded in. This work was successfully achieved, largely due to a spirit of very happy co-operation and mutual understanding by the delegates of the 14 different nations that attended; ten new International grades were agreed in the place of the 12 existing RMA and Singapore grades. The new grades are acceptable both to the consuming manufacturers as providing a better range of the available material suitable for their various compounding and manufacturing processes, and to the producing countries as being representative of the material available.

The new International samples of these grades are now being made up in New York, London and Singapore, from the master samples agreed by the Conference, and it is hoped that they will be ready to be put into operation in July of this year.

In addition to dealing effectively with these grading problems, the Conference also agreed officially to list other types of rubber which are available for specialized uses but marketed in smaller quantities than those grades which have been accepted on an International basis. Further, the Conference made revised arrangements for the establishment, preparation and distribution of International samples by agreeing to set up an International Sampling Committee. It also designated the RMA in the US as the permanent secretariat of the International Quality and Packing Conference, thus, for the first time, putting it on a permanent footing.

On the credit side of this Conference is not only the positive achievements but the fact that delegates from 14 different countries from both sides of the industry, many with apparently conflicting interests, met with such a spirit of goodwill and mutual understanding.

Following the close of the International Quality and Packing Conference, the International Rubber Study Group opened its Conference in Kuala Lumpur. Two members of your Association were invited by the Board of Trade to act as advisers.

Book Reviews

KAUTSCHUK-HANDBUCH, Vols. 1, 2, and 3. Bostrom, S., ed. (Stuttgart: Berliner Union, 1960). Price £26 5s. for four volumes.

The position in respect of textbooks on rubber technology is by no means as bad today as it was say ten years ago, but the shortage of authoritative texts is such that the publication of a new major encyclopedia must be welcomed. This is a four volume production, handsomely bound in PVC, and the three volumes so far received total no less than 1,348 pages. All aspects of rubber technology and science are dealt with most comprehensively, with a series of contributions by a distinguished panel of German authors grouped under the headings 'Raw Materials' (covering for example the chapters on natural rubber, the chemistry of rubber, vulcanization, and synthetic rubber chemistry), 'Manufacturing Techniques' (covering the technologies of natural rubber, styrene-butadiene copolymers, nitrile rubber, butyl rubber, softeners, fillers, colours, processing aids, textiles, and machinery, etc.), and 'Rubber Technology' (covering the manufacture of tyres, mechanical rubber goods, footwear, cables, cellular rubbers, etc.). Each contribution is usefully illustrated and is provided with references to source literature. The technical details provided where appropriate provide an interesting commentary on German techniques of rubber technology.

This German publication, although it is expensive, can thus be expected to join the encyclopedia for the French rubber industry by Genin and Morrisson, as works of reference for rubber technologists, and will undoubtedly stimulate interest in the textbook shortly to be published by the Institution of the Rubber Industry. It is to be hoped that this will bridge the gap between the American introduction to rubber technology recently edited by Professor Morton, and the Continental encyclopedias.

TRANSLATION FROM RUSSIAN FOR SCIENTISTS.—By C. R. Buxton and H. S. Jackson. (Published by Blackie and Son Ltd. Pp. xix + 299, price 30s.)

As Russian technical literature becomes more readily available, and as the western world realizes that in many fields this literature is worth reading, the need for the research and industrial scientist to have a working knowledge of the language is increased. This book has been written with this in mind and does not attempt to provide more than an introduction to the language. The reader is introduced to the Russian alphabet, which is one of the main obstacles to be overcome, with the aid of scientific words that are similar to their English counterparts, geographical place names and a number of phrases commonly used in physics and chemistry.

The problems of grammar are then dealt with in sufficient detail to enable an adequate reading knowledge of the language to be obtained and a large proportion of the book is devoted to sentences and texts for translation.

These are usefully arranged in sections covering a wide range of subjects and include a wide and varied vocabulary. Mastery of these should enable the student to develop considerable facility in reading Russian literature.

∴ Copies may be ordered through the Books Department, RUBBER AND PLASTICS WEEKLY, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

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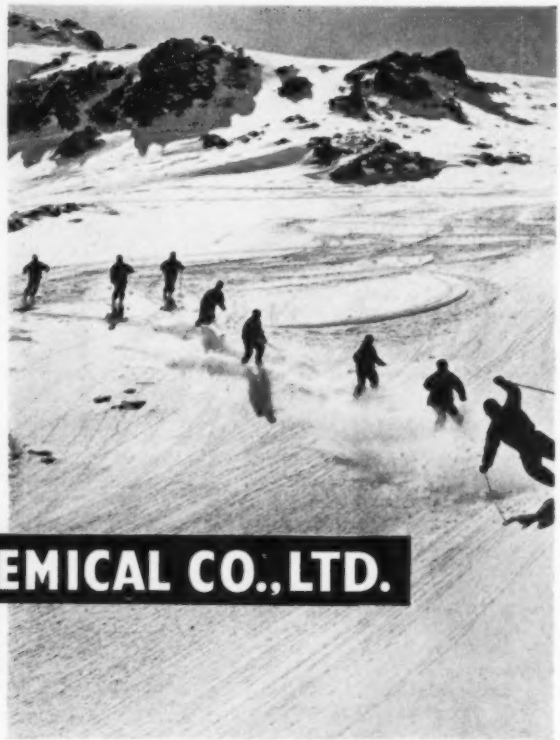

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Plantation Share Survey

THE spot price of rubber during last month touched its lowest level since the beginning of 1958. It broke through the psychological barrier of 2s. per lb. but the renewal of buying interest that this was expected to bring about has, on the whole, not materialized. Consumers in both the UK and Germany have been asking to have delivery of some of their orders postponed. Russian buying orders have remained at a very low level and China has stayed away from the market altogether. Perhaps the most discouraging news of all is that US car production during February is likely to be the lowest total for a similar month since 1952. Yet, despite all the recent disappointments, the beginning of a change of sentiment can be detected in places in the market. It is felt in some quarters that this change of attitude is based on two major factors.

Stock Reduction

Number one of these is that as the rubber season is now approaching its close in Malaya, holders of large stocks in Singapore, estimated in all at more than 140,000 tons, will have an opportunity to dispose of some of them over the next few months without seeing them replenished from current production.

Secondly, the price of rubber at the moment is such that buying interest must begin to pick up before very long, and it seems that if only the price of rubber can be held fairly stable for the next few months within a few pence of its present level, many of the consumers might be attracted back.

Together these factors give hope that holders of rubber in Singapore will have an opportunity to run down their stocks to more manageable proportions without further unsettling price levels. It is evident that Far Eastern stocks are diminishing as a result of cheap sales, and it looks as though prospects for the market will be better than that for most other commodities. As we have pointed out previously, last year production and consumption would have been almost equal had not the UK and US Governments upset the balance by releasing substantial quantities of rubber from their strategic stockpiles.

Near Stability

This year, despite the recession in the car industry both in the US and Europe, consumption is expected to fall short of production by a mere 25,000 tons — and this would quickly disappear if the new US Administration were to bring no more than a limited recovery in the US car industry. Taken on its own merits it is considered by many experts that the rubber market looks nearer stability than it has for some time, but until the anticipated renewal of buying appears, the outlook must remain one of caution.

Meantime, with the leading rubber firms expected to announce their 1960 results within the next two months it has been pointed out in some quarters that rubber shares are now about 30% below their peak levels of 1960-1961. This, of course, is a direct result of the setback in the commodity price and should not be taken as an indication that investors and market dealers expect a bad dividend season. As we have already pointed out, at their present levels shares of many companies could be cheap for those looking for the dividend, and in our opinion could well supply the long term investor with a stock of substantial growth shares.

Highest Yields

In this particular section of the Stock Exchange rubber shares currently provide the highest yields in the equity market based on dividends declared for 1959. Furthermore, there is little indication that there will be any general reduction in dividend declarations for this year. LINGGI PLANTATIONS, leader in this field, has already announced that its dividend is to be maintained in respect of 1960, which would offer a yield of just under £14 on every £100 invested And, we suggest, it may have been overlooked that most companies closed their accounts at the end of the calendar year. Profit margins we know have been well maintained throughout last year and the average 1960 price for first grade rubber was 2s. 8d. per lb., which compared with 2s. 6d. per lb. in 1959 and a mere pittance of 1s. 11¼d. in 1958.

As a long-term investment rubber shares must now be a better proposition than a few years ago. As our readers will know from our reports there has been a spate of mergers and takeovers within the industry lately and already there is a fairly broad list of individual companies with issued capitals of upwards of £1m. This has induced many substantial investors, including the big institutions, to interest themselves in this section. We consider there are many more to come before the industry settles and those who hold shares in companies likely to be subject to takeover offers can expect to get high prices for their holdings.

As is known, there is a good demand for estates by buyers domiciled in the eastern hemisphere and, of course, the larger companies are able to reduce production costs.

Bright Outlook

The outlook for this year is bright. At last year's top levels of up to 3s. 6d. per lb. many natural rubber users turned to synthetic. With the increasing output of natural rubber each year as postwar replantings are brought into tapping, the estates can afford to sell cheaper and regain some of the markets lost to synthetic. Profit margins, of course, are naturally reduced but production costs are much less at the lower price than they were when the commodity was selling higher. About 3d. per lb. is saved in export duty and considerable economies are being made from estate wages which are geared to the selling price. Furthermore, recent sales from the US and UK stockpiles, amounting to 145,000 tons, means that these stocks will not now be overhanging the market like the giant sword of Damocles.

Counter Offer

In a surprise move HIGHLANDS AND LOWLANDS PARA RUBBER challenged its rival GOLDEN HOPE with a counter offer for the four rubber companies in which it hoped to obtain control. The four rubber companies involved are EDINBURGH RUBBER ESTATES, SHELFORD RUBBER ESTATE, SOGOMANA RUBBER ESTATE and TROLAK ESTATES. Highlands bid was on a share exchange and cash basis. The terms are as follows:

Two 2s. units and 1s. cash for each 2s. unit in the £58,438 issued Edinburgh capital.

Two 2s. units and 6d. cash for every three 2s. shares in £139,994 of Shelford's £160,000 in issue.

Two 2s. units and 6d. cash for each 2s. unit in £51,720 of Sogomana's £100,000 capital.

Four 2s. units and 6d. cash for every three 2s. shares in £57,138 of Trolak's £64,904 capital.

Better Welcome

The offers for the four companies are cum any dividends to be declared. On the whole these terms have been given a better welcome. For it is felt that it cuts out the proposal included in the original merger scheme whereby Golden Hope was to obtain — by a share exchange — the cross shareholdings of the four companies at a price which looked much too low. And except in the case of Trolak the cash element in the terms plus the 'not less than 27½%' final forecast by Highlands effectively raised the net cash content to a level above that offered by the special dividends included in the original merger scheme.

Finally, the criticism directed by Edinburgh holders at the original proposals has clearly registered. Under the merger their shares were effectively valued at only three-quarters of a Sogomana. Now these are valued at the equivalent offered for each Sogomana Ordinary.

As RPW went to press it was learnt that, due to opposition, the board of Highlands and Lowlands has been forced to withdraw its offers for Shelford Rubber Estate, Sogomana Rubber Estate and Trolak Estates, but it is going ahead with its share and cash payment offer for Edinburgh Rubber Estates.

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

CONFIDENCE: this is the message behind last week's announcement from the giant IMPERIAL CHEMICAL INDUSTRIES that it is to increase its capacity for manufacturing polyvinyl chloride by more than 40% within two years. It announced that a new PVC plant is now being added to its existing plastics manufacturing plant at Hillhouse Works, near Blackpool.

This, it was reported, would be capable of raising capacity from the present level of 70,000-80,000 tons a year to as much as 115,000 tons. I.C.I. pointed out that demand in the UK for vinyl materials has expanded nearly ten times to its present annual level of 110,000 tons during the last ten years. 'It is to keep ahead of this rapid development that I.C.I. is now erecting a new plant which is capable of expansion to meet the most optimistic market requirements of the future,' it was stated.

I.C.I. also announced last weekend the erection of a general purpose plant by its heavy organic chemicals division at the massive Billingham works in County Durham. Due for completion late next year, it is expected to provide better facilities for the rapid manufacture of tonnage batches to the group's many development products. Though it will still be necessary to build special pilot plants occasionally, I.C.I. thinks the new plant, and those already existing, will be capable of manufacturing the majority of chemicals planned for development in the next few years.

As we are in one of the peak periods of news from the board rooms, it will not come as a surprise to our readers to read about the many that have come to hand in the industries our readers are interested in. O. AND M. KLEEMANN, the plastic material makers, sent word to the Stock Exchange that its dividend was to be raised an equivalent of 15% to 20%. Trading profits of the group increased from £535,700 to £680,600. It included £60,200 in respect of the realized capital profit in a subsidiary company. After meeting the heavier depreciation bill, etc., provisions, the profit balance, before tax, came out at £538,500, against £431,200. The shares have gone up since the results became known.

ANCHOR CHEMICAL is another firm which is raising its payment to shareholders. In this instance the dividend has been raised from the equivalent of 13¼% to 17%. Group profits have increased to £236,100 against the previous figure of £164,400 and the net profit after meeting a heavier tax charge, has gone up from £89,400 to £121,300.

From ALBRIGHT AND WILSON came news that its profits for the year at

Continued on page 363

Share Price Movements

Par Value	Company	1960-61 High	Low	Feb. 18	Latest
£1	A.E. Ind. Ord.	67/-	39/-	41/-	42/3
5/-	Albright & W. Ord.	34/3	25/-	26/9	27/-
£1	„ „ „ 5% Pref.	17/3	15/3	15/6	15/6
5/-	Anchor Chemical Ord.	23/6	14/9	23/3	22/-
4/-	Airfix	45/-	23/-	39/6	45/-
4/-	„ Non Voting	43/6	23/-	38/3	43/6
5/-	Andersons Rub. Ord.	—	—	3/9	3/9
£1	Angus Geo. Ord.	68/-	34/9	66/9	69/3
5/-	Ault & Wiborg Ord.	28/-	20/-	25/9	25/6
£1	Avon India Rubber Ord.	46/6	30/-	33/9	40/-
£1	„ „ „ 6% Pref.	20/-	17/6	18/9	18/9
10/-	Bakelite Ord.	52/-	33/3	50/-	50/6
£1	„ 6% Pref.	19/3	16/9	18/-	18/-
£1	Baker Perkins Ord.	49/9	39/1½	50/6	48/3XR
4/-	Bank Bdg. Rubber Ord.	4/3	1/9	2/-	2/6
4/-	Bettix	—	—	8/3	9/-
4/-	Brammer H. Ord.	18/6	16/3	16/9	16/6
10/-	Bridge, David Ord.	66/6	48/-	52/6	63/3
5/-	Bright, John Ord.	18/6	14/3	16/-	15/9
5/-	Brit. Blting & Asb. Ord.	—	—	18/6	19/6
£1	„ „ „ „ Pref.	—	—	15/9	15/9
5/-	British Electronic Indus.	—	—	13/3	13/6
2/-	Brit. Ind. Plas. Ord.	13/-	5/3	12/3	12/9
2/-	„ 10% (tax free) Pref.	4/9	4/3	4/9	4/9
£1	British Xylonite Ord.	82/6	50/6	81/3	82/-
£1	„ „ 5% Pref.	18/9	14/-	15/-	15/-
£1	BICC Ord.	61/3	47/6	57/-	56/-
5/-	BTR Ind. Ord.	17/9	9/9	15/9	16/3
£1	„ „ 7½% Pref.	24/3	21/3	21/3	21/6
£1	Courtaulds Ord.	59/4½	42/-	43/6	43/6
£1	„ 5% 1st Pref.	17/9	15/-	15/3	15/3
£1	„ 6% 2nd Pref.	21/-	18/-	17/6	17/6
4/-	Cow, P. B. Ord.	9/9	6/9	8/1½	8/4½
£1	„ „ 5% Pref.	15/6	14/-	13/6	13/6
1/-	Dannimac Mfg. Ord.	14/6	9/-	12/3	12/3
10/-	De La Rue Ord.	78/6	47/9	59/9	61/9
£1	„ „ „ 3½% Pref.	12/-	10/-	10/6	10/6
10/-	Distillers Co. Ord.	38/3	27/9	33/-	33/9
£1	„ „ 6% Pref.	22/-	19/6	20/-	20/-
£100	„ 5% Conv. Loan	£96	£93½	£95	£95
£100	„ 5½% Unsec. Loan	£97	£85	£84½	£83
10/-	Dunlop Rubber Ord.	30/6	19/9	24/-	23/6
£1	„ „ 5½% Pref.	19/-	15/6	15/6	15/9
£100	„ 3½% 1st Debs.	£78	£68	£69	£68
£100	„ 4½% 2nd Debs.	£87	£77½	£79½	£79½
£1	Eng. Elect. Ord.	53/6	30/9	34/3	33/9
4/-	Ebonite Cont. Ord.	14/3	7/9	8/-	8/-
£1	English China Clays Ord.	95/-	69/-	90/6	91/9
£1	Goodyear Tyre 4% Pref.	12/9	10/6	10/6	11/-

Par Value	Company	1960-61 High	Low	Feb. 18	Latest
5/-	Greeff Chem. Ord.	35/-	23/-	31/-	29/9
10/-	Greeff Chem. 5½% Pref.	9/-	7/9	7/9	7/9
5/-	Hackbridge Hldg.	8/7½	5/-	5/6	5/9
4/-	Greengate & Irwell Ord.	6/6	5/3	5/9	5/9
£1	Harrisons & Crosfield Dd.	64/-	48/6	49/3	53/-
1/-	Hunt & Moscrop Ord.	2/9	1/4½	2/-	2/-
£1	Imp. Chem. Ord.	75/3	54/3	70/6	70/1½
£1	„ „ 5% Pref.	18/-	15/6	15/9	15/9
£100	„ 4½% Unsec. Loan	£89½	£80½	£81½	£80
£100	„ 5½% Conv. Loan	£212½	£90XC	£92½	£92½
1/-	Kleemann (O. & M.) Ord.	14/3	8/3	11/3	13/1½
£1	„ 6½% Pref.	19/-	16/6	16/6	16/9
5/-	Laporte Ind. Ord.	33/6	21/3	26/3	26/6
£1	„ „ 7½% Pref.	24/3	22/3	22/3	22/-
£1	Leyland & Birm. Rubber Ord.	63/-	46/3	47/6	47/3
£1	„ „ „ 6% Pref.	19/-	17/6	18/1½	18/1½
2/-	London Rubber	16/6	11/-	15/3	16/3
£1	„ 6% Red. Cum. Pref.	20/-	18/-	18/6	18/6
£1	McKechnie Bros. Ord.	71/6	54/6	55/-	54/6
£1	„ „ 'A' Ord.	69/3	53/-	55/-	53/3
£1	„ „ 6% Cum. Pref.	18/-	16/-	17/-	17/-
5/-	Monsanto Chem. Ord.	31/-	23/-	26/-	23/6
£1	„ „ 3½% Pref.	12/9	12/-	12/-	12/-
£100	„ „ 6% Debs.	£103½	£97	£97	£97
5/-	Miles (H.G.) Hldgs. Ord.	11/3	7/6	7/6	7/6
2/-	Movitex	—	—	6/3	7/-
£1	North British Rubber	21/3	15/6	15/7½	16/-
5/-	Northwestern Rubber	13/-	9/-	12/-	12/-
5/-	Plastic Enginrs. Ord.	36/-	20/-	35/6	35/-
5/-	Redfern Holdings Ord.	5/9	3/1½	3/6	3/6
2/-	RFD Ltd. Ord.	6/6	3/4½	4/-	4/-
£1	„ „ 5½% Pref.	14/6	12/9	13/9	13/9
2/-	Rubber Imp. Ord.	7/9	3/1½	5/3	5/-
2/-	„ „ 'A' Ord.	7/-	3/-	3/9	5/-
£1	„ „ 5% 1st Pref.	15/-	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	19/3	16/9	17/3	17/-
4/-	Shaw Francis Ord.	27/6	17/3	23/-	22/9
2/-	Silentbloc Ord.	13/3	8/6	9/-	8/9
5/-	Storey Bros.	42/6	28/3	40/3	42/3
2/-	Sussex Rubber Ord.	2/3	1/3	2/-	1/9
5/-	Sutcliffe Speak Ord.	15/9	11/-	14/-	14/-
£1	Tootals	33/6	26/4½	32/9	31/9
£1	Turner & Newall Ord.	65/-	48/3	61/10½	63/9
£1	„ „ „ 7% Pref.	25/-	21/3	21/3	21/3
5/-	Universal Asbestos Ord.	50/-	24/-	25/3	25/3
5/-	Viscose Dev. Ord.	16/6	14/9	15/-	15/-
5/-	Warne W. (Holdgs.) Ord.	18/9	14/9	15/9	15/6

Rubber Markets

LONDON

Prices rose in conformity with improved Eastern advices. Short-covering of terminal positions and fair interest in April shipments of No. 1 sheet kept values very steady for a time on the higher level as sellers were reserved. Later the advance was reduced as buyers withdrew, and sellers offered more freely.

Latest prices are as follows:

No. 1 RSS Spot: 24¾d.-25d.

Settlement House:

April 24¾d.-25d.

May 24¾d.-25d.

June 24¾d.-25d.

April/June 24¾d.-25d.

July/September 24⅝d.-24⅞d.

October/December 24⅝d.-24⅞d.

January/March 24⅝d.-24⅞d.

No. 1 RSS cif basis ports:

March 24¼d.-24½d.

April 24⅜d.-24½d.

May 24⅜d.-24½d.

Godown:

March 82 Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, March, April, 14s. 2d., cif European ports. Spot, seller, 14s. 9d. Bulk, seller, d.w. 14s. Creamed, seller, 13s. 11d. nominal. Normal, seller, March, April, 11s. 9d.

NEW YORK

The New York rubber market ruled as under on February 27:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Feb. 27	Previous
No. 1 RSS, Mar.	29⅜b–30a	29b –29¼a
Apr.	29¼b–29⅜a	28⅝b–29¼a
No. 2 RSS, Mar.	29⅛b–29¼a	28⅝b–29¼a
Apr.	29⅛b–29⅜a	28⅝b–29a
No. 3 RSS, Mar.	29¼b–29⅜a	28⅛b–29a
Apr.	29¼b–29⅜a	28⅝b–28⅞a
No. 1 RSS, Spot	30n	29⅜n
No. 3 amber blanket crepe, March ..	24⅛n	24¼n

FUTURES—REX CONTRACT

	Feb. 27	Prev. Close
March ..	29.95b–30.25a	29.30b–29.40a
May ..	29.55b–29.70a	29.10t
July ..	29.30b–29.35a	28.75b–28.80a
Sept. ..	29.20b–29.25a	28.60b–28.80a
Nov. ..	29.15b–29.25a	28.55b–28.70a
Jan. ..	29.05b–29.25a	28.45b–28.65a

Sales: 35. Tone: Firm.

Futures on February 27 were firm on covering. A gain of about ¼ cent or more was recorded in some positions. Traders said the strength in Singapore aided the market here. In the physical market, traders noted a firm undertone but buying interest was light. In late trading, futures continued firm and held the ¼ cent gain. RSS in the physical market were up about ¼ cent for the day but inactive.

SINGAPORE

Overseas advices were better and opening quotations were steady on February 27. Initial selling was readily absorbed. Prices advanced by one cent during the morning. Sentiment still appeared to be good but interest in lower sheets was limited at the higher levels. March No. 1 RSS was switched in fair quantity at even money to April No. 1 RSS. Early in the afternoon the market advanced on good buying, lack of sellers putting prices to the day's high. There were only minor pauses. Lower sheets continued neglected. Buying continued through to the unofficial close at 84 cents.

	Malayan cents per lb., fob Malayan ports to open ports	
	Feb. 27	Prev. Close
No. 1 RSS, March ..	83⅞–84¼	81⅝–81⅞
April ..	83¾–84	81⅞–82
No. 2 RSS, March ..	82⅞–83⅛	81 –81½
No. 3 RSS, March ..	81⅝–82¼	80¼–80⅝
No. 4 RSS, March ..	78¼–79½	76½–77½
No. 5 RSS, March ..	69½–70½	67 –68
No. 1 RSS, Spot ..	83⅛–83⅞	81⅛–81⅞
No. 3 blanket thick re-milled crepe, March	65½–66½	64½–65½
No. 1 fine pale crepe, March	87½–88	86 –86½
2X thin brown crepe, March	64 –65	62½–63½

Tendency: Steady.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 165.20d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on February 27:

	Guilders per kilo	
No. 1 RMA	Feb. 27	Previous
March	2.41½	2.35
April	2.42	2.36
May	2.42	2.36
June	2.42	2.36
April/June ..	2.42	2.36
July	2.42	—

Sales: Nil. Tendency: Firm.

DJAKARTA

The market remained unchanged from Saturday's levels on February 27, despite a firmer trend overseas. Transactions of abour five tons for sheet No. 1 took place today at 31.00 rupiahs per kilo and of five tons of sheet No. 2 at 29.75 rupiahs per kilo. The market closed quiet. Sheet No. 1 was unchanged from Saturday's final level at 30.50 rupiahs per kilo, buyers.

	Rupiahs per kilo	
	Feb. 27	Previous
Spot No. 1 priok ..	20.50b	30.50b
Spot No. 2 priok ..	29.25b	29.25b
Spot No. 3 priok ..	27.25b	27.25b
No. 1 fine pale crepe, spot	28.25b	28.25b

CEYLON

The price of No. 1 RSS at Colombo on February 27 was 101¼ (98) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on February 27 was 26.25 (26.00) US cents per lb.

STOCK MARKET

Continued from page 322

£5,045,000 showed little change as foreshadowed from the aggregate £5,025,000 for the previous year of the company, and A. BOAKE ROBERTS acquired during 1960. The board reported that operations of the overseas companies had been disappointing but the UK companies have continued to make progress. As forecast the total dividend on capital increased by the Boake acquisition was brought up to 20% against the previous equivalent of 18.3%. And it has already been foreshadowed that this rate should be maintained for 1961.

ENGLISH CHINA CLAYS, one of the leading blue chip favourites, disclosed that record sales and an exceptional measure of activity did not reflect in substantially increased profits. It seems that the group was not able to benefit to the fullest extent from the unprecedented demand for its main product, which is china clay, and although additions to production capacity have been made, demand throughout the year greatly exceeded normal output. It became necessary to recommission old-fashioned plant which had been closed down as modern installations were put to work. The current level of demand signposts that these fairly costly expedients to go ahead with production will have to continue and, until such times that new modern installation can handle the amount of incoming business, profitability will be inevitably reduced.

Major large scale expansion has been a characteristic in nearly all departments of the group, and a major capital programme involving some £4m. is being accelerated in view of the sharp increase in demand for china clay. Heavy expenditure on this type of production, stone quarries and transport fleets, and also upon acquiring freeholds of mineral properties reflects in the increase from £11m. to just under £13¼m. in the net value of fixed assets, and in the drop from just over £2m. to £1m. in quick resources.

A rights issue to provide £2m. on a basis of one-for-twelve at 70s., is being made, which will provide some of the cost of accelerating the capital programme, but although much is being done to increase output, the full benefits of recent and planned expenditure will take some time to accrue.

More Glass Fibre Reductions

For the second time within a month Fibreglass Ltd. has made price reductions in certain continuous filament process products. These latest reductions affect the price list for Fibreglass CF yarns manufactured from E (alkali free) glass.

TALKING OF MANY THINGS...

After Tenniel

MUEHLSTEIN SUPPLY

Virgin, Off grade and Processed
Thermoplastics at the LOWEST cost

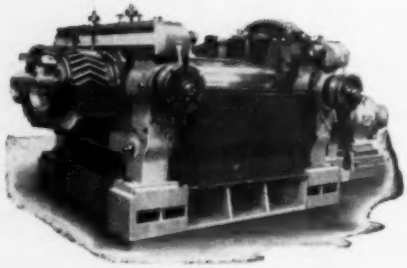
Thermoplastics, synthetic and reprocessed rubber

H. MUEHLSTEIN & CO./LONDON/LTD.

Thavies Inn House,
3-4 Holborn Circus, E.C.1
Tel: FLEet Street 6976
Cables: MULEBERT, LONDON. Telex No: 2-3551

An associate of H. Muehlstein & Co. Inc.,
521 Fifth Avenue, N.Y. 17, New York

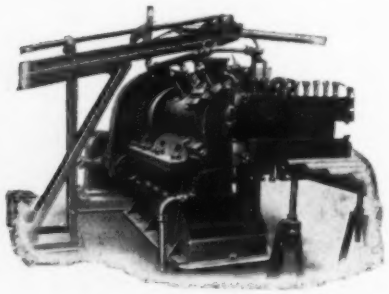
Latex Engineering Co



60in. x 22in. motor-driven single-geared mixing mill, back-shaft drive, with safety guard, electro-mechanical brake, hinged and swivel guide plates for easy cleaning.

Also Makers of:
Internal Mixers, Calenders and all types of Machines for Mechanical Rubbers and Proofing of Fabrics

8in. Forcing Machine fitted with 'Camel-Back' Dies driven by variable speed A.C. Motor equipped with Feed and Output Conveyors



VICTORIA STREET, DROYLSDEN, MANCHESTER

Telephone: Droylsden 1251 *Telegrams: Washer, Droylsden*

London Office:

4 CLEMENTS INN, LONDON, W.C.2

Telephone: CHAncery 2401-2 Telegrams: Plastrub, Estrand, London

Industry INTELLIGENCE

Technical Data

Robac PTM

A technical bulletin is available from Robinson Brothers Ltd., Ryders Green, West Bromwich, describing the use of Robac PTM in natural rubber and SBR.

The outstanding property of Robac PTM (di-pentamethylene thiuram monosulphide) in natural rubber is that it behaves as a true delayed action accelerator. The cure is very fast after the onset of vulcanization making it a useful material in compounds for blown sponge, moulded and extruded goods and fast press cured mechanicals.

It has the additional advantage of imparting no taste, colour or odour to the cured article, making it of particular interest in food rubbers.

Robac PTM has also been examined in SBR, nitrile and butyl rubbers and has been found to be effective in all three. It is of particular value in SBR in which it maintains its delayed action and high activity and the technical bulletin includes the results of the test work, published by Robinsons for the first time.

Durez 19387

A data sheet is available from Omni (London) Ltd., 35 Dover Street, London, W.1, of a recently developed phenolic moulding compound of which they are the sole distributors in the UK.

Durez 19387 is a quartz fibre-filled two-stage phenolic material. It is designed to provide minimum erosion on exposure to high velocity gas streams at temperatures as high as 6,000°F. Moulded components made from the compound provide good thermal insulation and the thermal conductivity is 6.96 x 10^{-4} cal./sec./cm.^{2}/°C./cm. It is recommended as a material for rocket motor liners, blast tubes and nozzles and other missile applications.

Polysar Krynol 654

The introduction of a new general purpose oil-extended rubber was announced previously (February 25, 284). Polysar technical report No. 11: 1A issued by Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4, gives details on the uses and properties of this material.

Polysar Krynol 654 is a low cost, oil-extended, cold, butadiene-styrene copolymer with good processing characteristics. Identical in bound styrene content, oil content, emulsifier and stabilizer to Polysar Krynol 652, it has a raw polymer viscosity some 11 Mooney points lower (ML-4 at 212°F. —41).

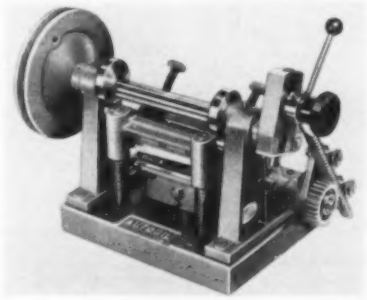
No breakdown prior to mixing is necessary and processing is easy even when heavily loaded. The low viscosity minimizes processing temperatures and thereby helps to ensure scorch safety.

The material is recommended for the manufacture of high quality, low cost soling of all types, and moulded and extruded mechanical goods.

Machines, Materials and Equipment

High Speed Guillotine

An addition to their range of Autogil automatic guillotines has recently been made by Wallis Engineering Co., 339 Warwick Road, Birmingham 11.



This is the model 4 type H5 and it has been designed for the rapid production of any length pieces of materials up to a maximum of 4in., from coil of strip material not exceeding 4in. in width or ¼in. thickness (0.015in. for metals). The machine can produce 300 cut pieces per minute to a consistent and high degree of accuracy. The company also supply suitable motors, pulleys, and other accessories for driving the machine.

Publications

BCL Packaging Films

British Cellophane Ltd., a large manufacturer of packaging films, has issued a booklet called 'Call in BCL,' which with the aid of several photographs outlines the scope of the BCL service which is available to all users of transparent films.

Among the articles included in the publication is one on mechanical know-how which deals with working problems and tomorrow's machines, and one on package design and wrapping aids. At the end of the book is a list of BCL films, on which further information can be obtained from the manufacturers at Henrietta House, 9 Henrietta Place, W.1.

Robinson Brothers

The range of chemicals at present manufactured by Robinson Brothers Ltd., Ryders Green, West Bromwich, is given in a catalogue recently issued by the company. This is divided into three sections, covering those materials available in commercial, pilot plant and evaluation quantities.

Many of the chemicals quoted are for use in the rubber and allied industries and are sold under the trade name Robac. Details of the uses of these products are availiable from Robinsons on request, as are technical data sheets for most of the chemicals available in commercial and pilot plant quantities.

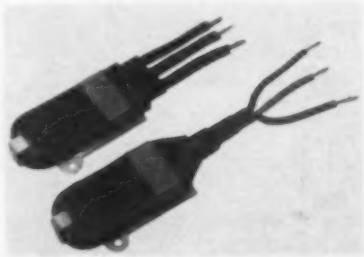
Engineering Equipment Leaflet

The Engineering Equipment Users Association, who claim to provide an effective means for co-ordinating user opinion and for its presentation alongside the views held by manufacturing interests, have issued a short leaflet about the association's origin and objects, its activities, and the conditions of membership.

Copies of this leaflet can be obtained from the association at 20 Grosvenor Gardens, London, S.W.1.

Esso Chemicals

A booklet called 'Petroleum Chemicals for Industry,' has been issued by Esso Petroleum Co. Ltd., giving brief details of Esso Chemicals available in the UK. This publication can be acquired from the company at 50 Stratton Street, London, W.1, together with more comprehensive information on any of the products mentioned in the booklet which include olefins, polymers, solvents and miscellaneous chemicals.



A French development in industrial circuit breaker design is the production of neoprene synthetic rubber as an insulant and protective covering. The breaker shown here, called the 'Minirupteur', is completely insulated where previously it had been difficult to provide sufficient protection for the delicate mechanisms of these high-precision electrical contacts

Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER AND PLASTICS WEEKLY *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. C.i.f. duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated. Grades are expressed as follows:* 1001/2/6 = *grades* 1001, 1002 *and* 1006.

(e-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (e-i)—Ex-installation (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered BM—black masterbatch CBM—cold, black masterbatch CNP—cold, non-pigmented CNS—cold, non-staining COE—cold, oil extended COELC—cold, oil extended, light coloured CO/BM—cold, oil/black masterbatch CPOE—cold, pigmented, oil extended CRE—cold, rosin extended dw—Dry weight HN—high nitrile HNP—high nitrile, powder HP—hot, pigmented HS—high styrene HMW—high mol. wt. LMW—low mol. wt. MHN—medium high nitrile MLN—medium low nitrile MMW—medium molecular weight MN—medium nitrile NS—non-staining TS—total solids RTV—room temp. vulc.

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (e-qdp)
(min., 70,000-lb. lots)

1000/1	Hot, Non-Oil	23.1
1002/6/7	,, ,,	23.34
1009/11	,, ,,	23.71
1012	,, ,,	23.24
1013	,, ,,	23.94
1500/1/2	Cold, Non-Oil	23.1
1703	COE, 25% Oil	*20.31
1705	,, ,,	*20.07
1707/8	,, 37.5% Oil	*18.89
1710/12	,, ,,	*18.66

*Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (e-sUK)

1004/6	Hot, non-oil	22.25
1009	,, ,,	24.0
1018	,, ,,	24.75
1019	,, ,,	24.5
1500/2/7	Cold, non-oil	22.25
1503	,, ,,	24.25
1703	COE	20.5
1708	,,	18.0
1712	,,	17.75
1713	,,	16.75
3014	Hot, non-oil	25.75
3105/6	Cold, non-Oil	22.25
3110	,, ,,	24.0

Cariflex (Shell Chemical) (e-sUK)

S-1000	Hot	22.25
S-1002	,,	23.375
S-1006	,,	22.25
S-1009/11/13	,,	24.0
S-1500/2/9	Cold	22.25
S-1600/2	CBM	19.625
S-1605	,,	19.375
S-1606	,,	18.75
S-7652	,,	20.0
S-1703	COE	19.25
S-1707	,,	18.0
S-1709/12	,,	17.75
S-1803	COBM	17.875
S-1806	,,	16.625
S-1807	,,	17.375
S-1808	,,	15.25

FR-S (Firestone) (delUK*)

1000/1/4/6/7 and 195	Hot	22.50
1500/2 and 146	Cold	22.50
1703 and 173	OE	19.11
1710/12 and 184	,,	18.00
178	,,	18.25
201	,,	16.71
1009 UK Specialty		23.06
1012 ,, ,,		22.59
1013 ,, ,,		23.59
1014 ,, ,,		26.18
181 ,, ,,		22.50
182 ,, ,,		23.29
147 ,, ,,		20.94
158 ,, ,,		28.00
158-S		27.50

*Import Duty not included

Int. Synthetic Rubber (d)

Intol 1500/2	22.5
Intol 1509	22.5
Intol 1570	23.5
Intol 1006	22.5
Intol 1710	18.0
Intol 1712	18.0
Intol 1778	18.25

Naugapol (Naugatuck Chemical) (e-sUK)

1016	28.0
1018	28.5
1019	28.0
1022	31.0
1023	32.75
1503	27.75
1504	34.5
6101	26.25
6102	27.75
K-45	30.75
K-50	31.5
KO-50	29.0
6003	28.5
6100	32.25

ANIC (e-qdp)

1500	22.25
1502	22.25
1708	18.00
1712	17.75

Philprene (Phillips) (d)

1000/6	Hot, non-pig.	22.50
1009	,, ,,	24.25
1018	,, ,,	26.97
1019	,, ,,	26.50
6701	,, ,,	24.23
1500/2	CNP	22.50
1503	,,	26.27
6630	,,	25.18
6632	,,	24.23
1601	CP	19.70
1603	,,	19.80
1605	,,	19.625
1606	,,	19.00
1608	,,	18.90
1609	,,	21.12
6662	,,	18.90
6655	,,	19.80
1703	COE	20.75
1708	,,	18.25
1712	,,	18.00
6700	,,	18.01
1803	CPOE	18.125
1805	,,	16.11
1808	,,	16.50
6608	,,	15.27
6753	,,	15.61
6754	,,	15.45
6755	,,	17.68

Plioflex (Goodyear) (ex-wUK)

1006	HNP	22.25
1500/2/7/8	CNP	22.25
1006	S	22.75
1703	COE	19.25
1710/12	,,	17.75
1773	COELC	19.25
1778	,,	18.0
B—6		27.5
B—5		28.0

Polysar (Polymer UK) (e-sUK)

S Hot		22.25
S-630 Hot		22.25
Kryflex 200 Cold		23.5
Krylene		22.25
Krylene NS		22.25
Krylene 602 Cold		22.25
Krynol 651 COE		17.75
Krynol 652	,,	18.0
S-X 371 Process Aid		24.0

Synpol (Texas-US Chemical) (e-qdp)

1000/1	Hot	22.25
1002	,,	22.47
1006/7	,,	22.25
1009	,,	22.81
1012	,,	22.38
1013/61	,,	22.25
X274	,,	23.45
8000	,,	22.25
1500/02/51	Cold	22.25
1703	COE	19.25
1707/8	,,	18.0
1711	,,	17.88
1712	,,	17.75
8200	,,	18.0
8201	,,	16.6
8202	,,	16.38
8152	CBM	18.6
8151	COBM	18.2
8253	,,	15.84
8254	,,	15.45
8255	,,	14.8
8267	,,	16.4

(Masterbatch prices US cents per lb. fas Gulf ports)

SBR LATICES

Copo (Copolymer) (cifUKdp)
(10-ton lots)

2101	(dw)	46.3
X-765	,,	40.8
X-800	,,	37.2
2102/5	,,	38.0

Pliolite Rubber (Goodyear) (d)

2000	40

Latex (dw)

2001/4/5/8	40
5350	40

Pliolite Resin (Goodyear) (d)

101A	(dw)	44
150	,,	50
151	,,	35
160	,,	50
170	,,	50

Hycar (B. F. Goodrich) (ddp)

2507 (HS) dw	48

Polysar (Polymer UK) (e-sUK)

Latex, type IV	32.5 TS
Latex, type 722	31.75 TS
(Non-returnable 45-gallon drums)	(e-i)
Latex, type 722 (bulk quantities)	28.75 TS

Int. Synthetic Rubber (ex-wks)

Intol Latex M23B/R23/F28	22.25
Intol Latex 62A	27.0

Dylex (Koppers Int. CA) (fas)

K-42A/52/51/900	31.6

ACRYLONITRILE TYPES

Butaprene N (Firestone) (cifUKdp)

NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum (e-s)

N—1	7[illegible]
N—3A	52
N—5	52
N—6G/7/8/600X	45

Hycar (British Geon) (UKd)
(500-lb. lots and over)

1001	High Nitrile Hot	52
1041	,, ,, Cold	52
1002	MHN Hot	45
1042	,, Cold	45

Hycar (B. F. Goodrich) (ddp)
(500-lb. lots and over)

1411	HNP	66
1432	MHN (crumb)	64
1072	,, (carboxyl)	66
1312	,, (liquid)	55
1043	MLN	51
1014	Low Nitrile	61

I.C.I. (min., 5-cwt. lots) (UKd)

Butakon A-4051 HN Cold	52
Butakon A-3051 MN Cold	45
Butakon A-3002 ,, ,,	45

Paracril (US Rubber) (dwe-sUK)

18-80	Low Nitrile	61
AJ	,, ,,	50
B	MLN	51
BJ	,,	51
BLT	,, Cold	51
BJLT	,, ,,	51
C	MHN	59
CLT	,, Cold	59
CV	,, (crumb)	63
D	High Nitrile	67
ALT		51
OZO		47

Polysar (Polymer UK) (d)

Krynac 800 MN	45
Krynac 802 LN	45
Krynac 803 MN (low Mooney)	45
Krynac 801 HN	52
Krynac 804 (MN-cross linked)	45

ACRYLONITRILE LATICES

Butaprene N (Firestone) (cifUKdp)

N-300 (dw)	53
N-400 ,,	60.5

Chemigum Latex (Goodyear) (d)

200	(dw)	65
235/6	CHS ,,	60
245	B ,,	52
245/6/7/8	CHS ,,	52

Hycar (B.F. Goodrich) (ddp)
(dry weight, drum lots)

1551 High Nitrile	66
1552 MHN	57

Hycar (British Geon) (UKd)
(dry weight, 3 drums and over)

1561	High Nitrile	60
1571	,, ,, (carboxyl)	60
1562	MHN	52
1577	(modified)	52

ACRYLIC TYPES

Hycar (B. F. Goodrich) (ddp)

4021 Slab, 500 lb. and over.	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso (e-sUK)

Regular 035/150/215	21.75
Regular 217/8	21.75
Regular 325	21.75
Non-staining 165	22.75
Non-staining 268	22.75
Non-staining 365	22.75

Polysar (Polymer UK) (e-sUK)

Butyl 100/200/300		21.75
Butyl 301/400	NS	21.75
Butyl 101	NS	26.25
Butyl 402	NS	22.5

Hycar (B. F. Goodrich) (ddp)
(500 lb. and over)

2202 Brominated	68

NEOPRENES

		(ddp)
W	(dwdel)	42.62
WHV	,,	38.5
WRT	,,	48.37
WX/GN/GNA	,,	44.62
GRT and S	,,	45.62
AC	,,	57.125
KNR	,,	75.62
AC 'M' and 'S'	,,	57.125
CG/AD	,,	57.125

The above prices refer to neoprene produced in the U.S.A. Prices of neoprene types produced at Du Pont's Maydown, Northern Ireland, plant are as follows:

W	(dwdel)	38.5
WRT	,,	44.0
WX	,,	40.5

Latices—Dry
(per lb. del, min., 50 lb.)

571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILICONE RUBBERS

Midland Silicones
(500-lb. lots del)

Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23d. 6d.

I.C.I. Silicones

Gums (40-lb. lots del)	39s. 6d.-47s.
Stocks (250-lb. lots del)	22s.-35s.
Pastes (1000-lb. lots del)	27s.6d.-35s.9d.
Silcoset (RTV) (250-lb. lots del)	21s. to 24s.

REINFORCING RESINS AND RUBBERS

I.C.I. (min., 2-ton lots) (UKd)

Butakon S-8551	36.5
Butakon S-7001	33.5

Hycar (B.F. Goodrich) (ddp)

2007 (powder)	42.5

Pliolite (Goodyear) (d)

S—6B	36.5

Polysar (Polymer UK) (e-sUK)

SS-250 HS (bale)	27.25
SS-250 ,, (flake)	27.5
Kryflex 252 HS	25.5
Kryflex 202 (HMW Cold polymerized)	25.75

Cariflex (Shell) (e-sUK)

SP-103	27.75

Cyclite (Durham Raw Materials) 42

HYPALON (ddp)

20	48
30	60.25
40	50.75

Future Events

Institution of the Rubber Industry

Burton-on-Trent Section.—March 6 at the Midland Hotel, Station Street, Burton-on-Trent, at 7.30 p.m. 'The Scientific Basis of Vulcanization,' by Dr C. G. Moore (NRPRA).

Humberside Section.—March 9 at the Yarborough Hotel, New Holland, at 8 p.m. 'Development of SBR Manufacture in UK,' by K. G. Burridge, M.A., M.Ch.E., A.R.I.C., A.M.I.Chem.E. (International Synthetic Rubber Co. Ltd.).

North-Eastern Section.—March 6 at the Eldon Grill, Newcastle, at 7 p.m. 'Colours in Rubber and Plastics,' by C. Musgrave, A.M.C.T. (Geigy Co. Ltd.).

Southern Section.—March 8 at the Red Lion Hotel, Salisbury, at 7.45 p.m. (Joint meeting with the Royal Institute of Chemistry and the West of England section of the IRI.) 'Trends in Polymer Development for the Rubber Industry,' by Dr L. Mullins (NRPRA).

West of England Section. — See Southern section.

Plastics Institute

London and District Section.—March 7 at the Wellcome Building, Euston Road, N.W.1, at 6.30 p.m. 'Polyurethanes — Development and Uses,' by H. A. Hampton, B.Sc, Ph.D., and R. Hurd, B.Sc., A.R.I.C. (Imperial Chemical Industries Ltd.).

Southern Section.—March 9 at the Chemistry Department, University of Southampton, at 7.30 p.m. 'Control Instruments in the Plastics Industry,' by J. A. Dugon (Elliott Bros. (London) Ltd.).

Canadian Asbestos

Shipments of asbestos from Canadian mines during 1960 were substantially higher than in 1959, although they declined in December, April and July.

The total shipments in 1960 amounted to 1,119,240 tons, compared to 1,050,703 in 1959. December shipments amounted to 62,143 tons compared to 72,048 in the same month of 1959.

NEW COMPANIES

Ulu Tiram Manufacturing Co. Ltd. (681,143).—January 19. Capital: £250,000 in £1 shares. To carry on the business of importers, exporters, merchants and brokers of, and dealers in, rubber palm oil, gums, tea, coffee, sugar, jute, etc. The subscribers (each with one share) are: Clifford W. Orford (company accountant), Dennis A. Hammond (chartered secretary). The first directors are to be appointed by the subscribers. Regd. office, 10/15 Mincing Lane, E.C.3.

Streamlyte Mouldings (Marine) Ltd. (681,039).—January 19. Capital: £100 in £1 shares. To carry on the business of manufacturers of, and dealers in, plastics, resins, wood, metals, modelling and moulding materials, etc. The first directors are: Roy Staley, 119 Stanford Avenue, Brighton, 6; Gordon N. Staley, 17 Kimberley Road, Brighton; Ronald V. Norman, 3 Malvern Close, Worthing. Regd. office: 12 Western Street, Brighton.

Gordon, Payne Ltd. (681,225).—January 20. Capital: £10,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, goods manufactured from metal, timber, plastics, fabrics, cement, etc. The first directors are: Gordon G. Farish, 'High Trees,' Forest Ridge, Keston, Kent; Mrs. Neillie Farish, 'High Trees,' Forest Ridge, Keston, Kent (director of Graham Farish Ltd., Plantoids Ltd., etc.); Thomas G. Farish (director of Graham Farish Ltd., Plantoids Ltd., etc.); Peter G. Farish (director of West and Short Ltd.); and Francis T. B. Payne. Regd. office: 8 Widmore Road, Bromley, Kent.

Rainor Ltd. (681,345). — January 23. Capital: £100 in £1 shares. To carry on the business of importers, exporters, merchants of, and dealers in, metals, timber, wood and plastic veneers, furniture, home and house fittings, etc. The subscribers (each with one share) are: Percy Danzig, 103 Ravensdale Road, N.16 (manager); Lewis A. L. Nestel, C.A., 295 Watford Way, N.W.4, who is also the first director. Regd. office: 94 Baker Street, W.1.

Humber Plastics Ltd. (681,388).—January 24. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, plastic materials, etc. The directors are: Frank L. Saul, 6 Inglemire Avenue, Hull; Walter E. Hill, 24 Chestnut Avenue, Willerby. Regd. office: 339 Beverley Road, Hull.

Allied Structural Plastics Ltd. (681,426).—January 24. Capital: £100,000 in £1 shares (50,000 'A' shares and 50,000 'B' shares). The subscribers are: Thermo Plastics Ltd., Luton Road Works, Dunstable; Universal Asbestos Manufacturing Co. Ltd., Telpits, Watford. The first directors are not named.

Maycock Dental Laboratories Ltd. (682,003).—January 30. Capital: £100 in £1 shares. The directors are: Louis Friedman, 320 Great West Road, Heston, Middlesex; Samuel Isenberg, 9 Gatehill Court, W.11; John H. Maycock. Regd. office: 160 Earls Court Road, S.W.5.

Davatt Moulds Ltd. (682,173).—February 1. Capital: £1,000 in £1 shares. To carry on the business of plastic moulders and workers, plastic, general, electrical and precision engineers, etc. The first directors are: Harry Davies, Flat 2, 20 Ashfield Avenue, Kings Heath, Birmingham, 14; William A. Pyatt, 5 Witherford Croft, Solihull, Warwicks. Regd. office: Offices of Tongue and Co., Cornwall Buildings, 45 Newhall Street, Birmingham, 3.

A new type of 'bottomless' seat support is being used in the 1961 Reliant Mark VI three-wheelers. The seats are supported by all-rubber Vitaweb straps, which are said to have a wider elongation limit than conventional webbing.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

ACCOBOND (803,528) Synthetic resins used in industry. American Cyanamid Company, 30 Rockefeller Plaza, City of New York, State of New York, United States of America. Address for service is c/o Haseltine, Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 1; January 25 1961.)

LACRON (807,462) Plastics in liquid form included in Class 1. Ronuk Ltd., Portslade, Sussex. (Class 1; January 25 1961.)

(B797,421) All goods included in Class 10 made of rubber or of imitation rubber. Firma Rimbacher Gummiwaren - Fabrik Gesellschaft (a joint stock company organised under the laws of Germany), Rimbach i. Odenwald, Germany. Address for service is c/o Mathisen and Macara, 97 Jermyn Street, St. James's, London, S.W.1. (Class 10; January 25 1961.)

BORVIMAL (811,476) Chemical products used in industry, and polyvinyl acetate dispersions being chemical products for use in the manufacture of paints. Aktieselskapet Borregaard (a joint stock company organised under the laws of Norway), Sarpsborg, Norway. Address for service is c/o Gee and Co., 51 and 52 Chancery Lane, London, W.C.2. (Class 1; January 25 1961.)

BORVICOL (811,481) Chemical products, and polyvinyl acetate dispersions, all for use in industry. Aktieselskapet Borregaard (a joint stock company organised under the laws of Norway), Sarpsborg, Norway. Address for service is c/o Gee and Co., 51 and 52 Chancery Lane, London, W.C.2. (Class 1; January 25 1961.)

AIRFIX (811,161) Pneumatic tube conveyor installations, and parts and fittings therefor included in Class 7. Friedrich Tonne, 25 Kupferstrasse, Stuttgart-Vaihingen, Germany. Address for service is c/o Sydney E. M'Caw and Co., 17 St. Ann's Square, Manchester, 2. (Class 7; January 25 1961.)

CELPAK (806,886) Plastics included in Class 17, in the form of sheets, blocks, rods and tubes; imitation rubber and articles included in Class 17 made therefrom; and insulating materials. The Baxenden Chemical Co. Ltd., Clifton House, 83-117 Euston Road, London, N.W.1. (Class 17; January 25 1961.)

GLOVELLA (811,655) Plastics included in Class 17. L. S. Mayer (London) Ltd., 18-26 Essex Road, London, N.1. (Class 17; January 25 1961.)

PORVIC (809,759) Articles of clothing made of vapour-permeable waterproof materials consisting wholly or partly of synthetic resins or plastics. Pritchett and Gold and E.P.S. Co. Ltd., Dagenham Dock, Essex. (Class 23; January 25 1961.)

CHAMELLE (803,029) Imitation leather in sheet form and made of plastics. Sol Levy Ltd., 155-157 Great Portland Street, London, W.1. (Class 18; January 25 1961.)

JABLITE (803,977) All goods included in Class 17. Jablo Plastics Industries Ltd., Mill Lane, Waddon, Croydon, Surrey. (Class 17; February 8 1961.)

CLARITEX (804,228) Wire - reinforced transparent cellulose acetate sheets for agricultural and horticultural purposes. British Celanese Ltd., Celanese House, 22 and 23 Hanover Square, London, W.1. (Class 17; February 8 1961.)

PORVIC (809,486) Porous materials in sheet form made wholly or principally of plastics included in Class 17, none being for insulating purposes. Pritchett and Gold and E.P.S. Co. Ltd., Dagenham Dock, Essex. To be associated with No. 717,479

(3960, 403) and another. (Class 17; February 8 1961.)

BRYMOR (804,903) Materials coated with polyvinyl chloride plastics and included in Class 17. Brymor Ltd., The Tannery, East Peckham, Tonbridge, Kent. (Class 17; February 8 1961.)

REPOL (810,508) Natural and synthetic rubber; and plastics in the form of sheets, slabs, blocks and shaped sections and included in Class 17, and materials for sound and thermal insulation and for packaging included in Class 17. Dunlop Rubber Co. Ltd., Fort Dunlop, Erdington, Birmingham, 24. (Class 17; February 8 1961.)

SUPLEX (810,796) Soling and heeling material of rubber and of artificial rubber. G. B. Britton and Sons Ltd., Lodge Road, Kingswood, Bristol. (Class 17; February 8 1961.)

ACCOSTRENGTH (803,527) Synthetic resins for use in the paper industry. American Cyanamid Co. (a Corporation organised and existing under the laws of the State of Maine, United States of America), 30 Rockefeller Plaza, City of New York, State of New York, United States of America. Address for service is c/o Haseltine, Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 1; February 22 1961.)

POLYSAX (804,553) Wrappings and packaging materials in the nature of sacks made of flexible plastics, none being multi-walled sacks or sold as multiple units of sacks. British Visqueen Ltd., Imperial Chemical House, Millbank, London, S.W.1. (Class 16; February 22 1961.)

POLYFILM (809,893) Films of thermoplastics included in Class 17, for use in manufactures. The Dow Chemical Co. (a Corporation organised and existing under the laws of the State of Delaware, United States of America), City of Midland, State of Michigan, United States of America). Address for service is c/o W. P. Thompson and Co., 12 Church Street, Liverpool, 1. (Class 17; February 22 1961.)

HYCO (805,809) Piece goods made of plastics of the kind used for making up into articles commonly made of fibrous textiles. D. M. High and Co., Ltd., 1A West Bell Street, Dundee, Angus. To be associated with No. 805,810 (4304, 267). (Class 25; February 22 1961.)

MOTRAY (804,404) Drip trays of plastics for use under motor vehicles. S. C. Errington (Hanwell) Ltd., 132a Uxbridge Road, Hanwell, London, W.7. (Class 20; February 22 1961.)

MILLION-AIRE (806,969) All goods included in Class 27. The North British Rubber Co. Ltd., Castle Mills, Edinburgh, 3, Scotland. (Class 27; February 22 1961.)

SPRINGTEX (806,992) Floor coverings. Dunlop Rubber Co. Ltd., Fort Dunlop, Erdington, Birmingham, 24. (Class 27; February 22 1961.)

Increases of Capital

Nu-Foam Plastics (Sussex) Ltd. (609,711). Workers in plastics, wood, glass, etc., at the office of Charles Tyson and Co., 1 Castle Square, Brighton.—Increased on June 28 1960 by £4,900 in £1 ordinary shares, beyond the registered capital of £100.

Moto Plastics Ltd. (614,532), Pipewellgate, Gateshead, 8, Co. Durham. — Increased on July 8 1960 by £9,000 in £1 ordinary shares, beyond the registered capital of £1,000.

Latest Wills

Thomas Frederick Atkinson, of Oak-Lea, 171 Dickens Lane, Poynton, Cheshire, manager of the Manchester branch of James Walker and Co. Ltd., Woking, Surrey, who died on September 24 last, left £32,197 gross, £30,759 net value.

The Rt. Hon. Montague Charles Eliot, 8th Earl of St. Germans, K.C.V.O., O.B.E., of Port Eliot, St. Germans, Cornwall, who retired in 1951 as a director of Seaport (Selangor) Rubber Estate, and died on September 19 last, aged 90 years, left unsettled estate valued at £24,812 gross, £2,590 net value.

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

CHEMIST or technician required for general works control and development in department manufacturing extruded film. Practical experience in the extrusion of thermoplastics essential. The factory is pleasantly situated in North-West Kent. Good salary according to qualifications. Staff pension fund is in operation.—Full details of education and past experience to Box 846. (846)

ENGINEER wanted to assist in development work at rubber and plastics factory. Age 23/27 preferred, with drawing office or machine shop experience. O.N.C. or studying. Factory now in Hertfordshire but accommodation available when move to East Anglia completed late 1961.—Details of qualifications, experience, and salary required to Box 856. (856)

EXPANDING plastics company mainly engaged in extrusion has a number of vacancies for operatives with plastic experience, preferably in extrusion shift work. Good rates of pay. Works being transferred in approximately 9 months to country district. Housing assistance can be given.—Write giving details of experience to Box 864. (864)

EXPERIENCED rubber works foreman (nights). Good pay and prospects.—Apply Sam Kay Rubber Co. Ltd., Hope Mills, Portwood Place, Stockport. (876)

FOREMAN required to take charge of rubber moulding shop. The department is engaged in the manufacture of mechanical goods and knowledge of rubber/metal bonding is desirable.—Write stating age, present salary and full details of previous experience. Howard Clayton-Wright Ltd., Wellesbourne, Warwick. (858)

LABORATORY assistant aged 20/23 years required. Experience in latex and/or dry rubber manufacture preferred.—Reply in writing, stating age, qualifications and experience to: The Technical Manager, Guide Bridge Rubber Co. Ltd., Butcher Lane, Bury. (834)

MANAGEMENT accountant. Energetic works accountant required for expanding company in rubber industry with turnover approximately £1,000,000. Must have practical shop floor approach to costing and preferably some knowledge of rubber industry. Should be capable of taking charge of all works accounting. Salary not less than £1,000. Location large country town East Midlands.—Box 872. (872)

APPOINTMENTS VACANT

(continued)

MATERIAL control chemist with experience in the rubber industry required to take charge of mixed staff engaged on testing of raw materials, intermediate and finished products. The wide range of products manufactured in this factory provides varied and interesting work. Applicants should be of A.I.R.I. or equivalent standard.—Apply to Chief Chemist, Greengate and Irwell Rubber Co. Limited, Irwell Works, Ordsall Lane, Salford, 5. (877)

P.T.F.E. Mechanicals Production. Midlands manufacturer has unusually attractive opportunity for a man with experience and initiative to take complete charge of newly formed and expanding division in an enterprising company. An excellent salary will be paid to the right man. Our staff are informed of the vacancy and all replies will be treated in absolute confidence.—Box 843. (843)

SEALS. If you have had experience in production or development in any aspect of seal manufacture and want opportunity to work on your own initiative and expand with a progressive company, we will be able to use you. We have an excellent pension scheme and good salaries will be paid.—Write in confidence to Chief Chemist, B.A.L. Limited, Oakeywell Street, Dudley, Worcs. (844)

THE DISTILLERS COMPANY LIMITED

RUBBER TECHNOLOGIST

The Company has a vacancy for a Rubber Technologist in the Central Research Department at Epsom, Surrey. The work includes long-term research and development in the field of rubber technology.

Candidates, aged not over 35, must have several years' experience of rubber technology or of laboratory work in the rubber industry. They should hold a degree in Chemistry, a qualification of the Institution of the Rubber Industry, or an equivalent qualification.

The Company operates a non-contributory pension scheme.

Write
STAFF MANAGER
THE DISTILLERS COMPANY LIMITED
21/22 BOLTON STREET
LONDON, W.1.

Quote Ref: 8/61. *R.J.* (861)

APPOINTMENTS VACANT
(continued)

STAFF APPOINTMENT

DESIGNER AND FITTER ENGINEER OF HOSE COUPLINGS

A vacancy exists for a new junior staff appointment with an old-established and progressive rubber hose manufacturer in Hertfordshire as a fitter engineer for designing and supervising the assembling of low pressure and high pressure cotton and wire braided hose, and other hose fitting work.

Age between 30 and 40 years. Previous experience very necessary.—Box 850. (850)

Rubber Improvement Limited

require

Process Control Assistants

for an expanding production programme in their P.V.C. department

Applicants should have an educational standard up to H.N.C. and be familiar with modern production methods for P.V.C. sheet and with a knowledge of extrusion techniques.

Generous initial salary with excellent promotional prospects make these appointments a rare opportunity to an ambitious hard-working person.

Replies in strictest confidence to:—
The Secretary,
Rubber Improvement Ltd.,
Rilex Works,
Wellingborough, Northants.
(marked "Process Control Assistants.") (862)

APPOINTMENTS VACANT
(continued)

MILL ROOM
SHIFT FOREMAN

required by expanding group of companies in

N. East Cheshire

Wide experience of open mill and Banbury mixing, and the ability to obtain consistently good results by leadership are essential.

The position is permanent and pensionable, and offers scope for advancement within the group. Salary will be commensurate with experience and ability. Please reply, in confidence, giving full details of age and experience to **Box 857.**

(857)

RUBBER technologist required by Northwestern Rubber Co. Ltd. for technical service work concerned with reclaimed rubbers. Must be willing to travel.—Applications giving details of past experience and salary requirements to Northwestern Rubber Co. Ltd., Litherland, Liverpool 21. (870)

TECHNICAL superintendent required for substantial rubber company in the Midlands. Good salary paid to man of first-class experience in all aspects of manufacture of mechanicals and extrusions. Please send full details of positions held and salaries paid. Only men of proved experience and capability should apply.—Box 836. (836)

SENIOR CHEMIST

required by

Redfern's Rubber Works Limited.

Suitable applicant should be a graduate aged 30/35, and will understudy the present Chief Chemist who will retire in 1965. The salary will be appropriate to the position.—Applications to the Works Director, Redfern's Rubber Works Limited, Hyde, Cheshire. (855)

PA PERSONNEL ADMINISTRATION LIMITED
MANAGEMENT CONSULTANTS

TECHNICAL MANAGER
RUBBER AND PLASTICS PRODUCTS

A well-established progressive firm to the West of London, member of a large Industrial Group, is looking for a Technical Manager. This is a new appointment on the senior management team having responsibility for quality control and the development of new materials and processes. Aged 30 to 40, he will have a degree in Chemistry or equivalent and a Rubber Diploma, A.I.R.I. level. He must have experience of production in the field of "dipped goods." The right man must be a practical technologist with initiative and personality capable of welding and managing a team. An excellent salary will be paid; there is a contributory pension scheme and staff bonus, and there are other amenities.
(Ref. 6566/RJ.)

The identities of candidates will not be revealed to our clients without prior permission. Applicants should forward brief details, quoting the reference number, to:—

Personnel Administration Limited, Appointments Division, 2, Albert Gate, London, S.W.1.

Regional Offices: GLASGOW · MANCHESTER · BRISTOL · BIRMINGHAM · DUBLIN
LEEDS · NEWCASTLE (869)

APPOINTMENTS VACANT

(continued)

SENIOR RUBBER TECHNOLOGIST

required by

Redfern's Rubber Works Limited.

Suitable applicant should be aged 30/35 and have had considerable experience in the production and design of components for the motor industry. The salary will be appropriate to the position.—Applications to the Works Director, Redfern's Rubber Works Limited, Hyde, Cheshire. (854)

This column can be YOUR best BUYER or SELLER

RUBBER & PLASTICS

MACHINERY

Why not see for YOURSELF

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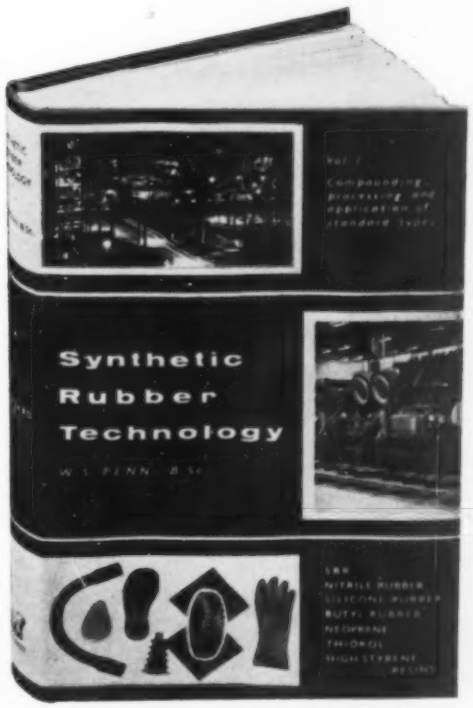

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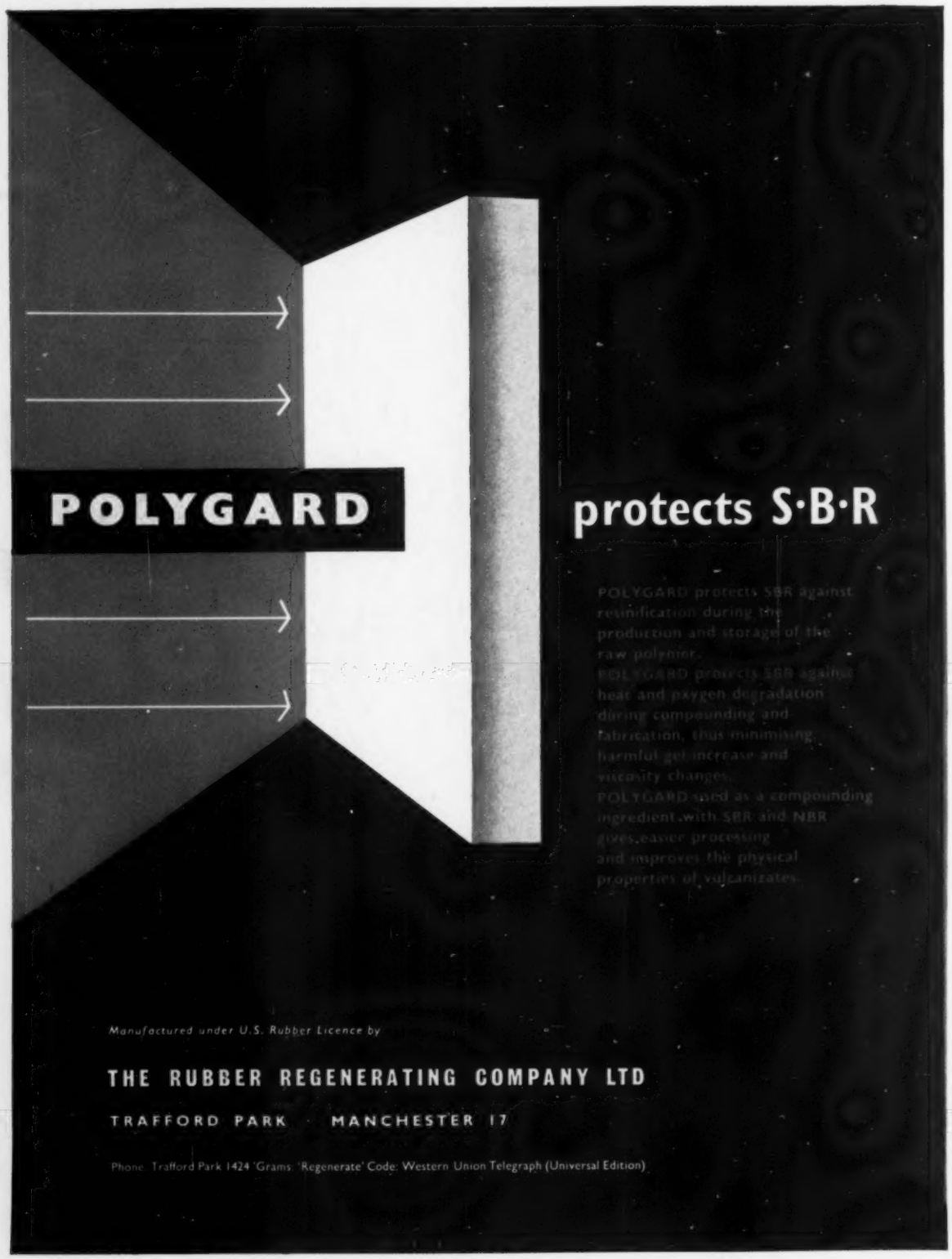
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